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JOURNAL of the AMERICAN VETERINARY MEDICAL ASSOCIATION

VOLUME CIX, NUMBER 773 AUGUST 1941

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"CORN STATES"

Geographically vs. Biologically

On the nation's agricultural and political maps, the corn states are a geographical area, inseparably identified with abundance, security, and devotion to principle.

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Journal of the American Veterinary Medical Association

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of the
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Memorable Comments on the Veterinary Profession

In March (1941) when the Committee on Military Affairs, United States Senate, was weighing the deferment of certain professional groups from the draft under the Selective Training and Service Act of 1940, President Wight, Congressman Gillie and Pathologist Schoening acting for the Association submitted statements in support of the inclusion of veterinarians and veterinary students in Senate Bill 783 which in its original form did not include them along with the medical and dental groups. While the steps taken have been successful independent of special legislative action (*vide*, memo below), these statements are memorable because they give a true account of what our small profession does for the nation in peace and war, particularly in more assuredly providing the people with ample and wholesome nourishment. The statements copied from the records* of the above named committee read as follows:

Statement of President Wight

The American Veterinary Medical Association is deeply interested in national defense and pledges its support to it. We believe, however, that there is sufficient reason why graduate veterinarians and veterinary students should be included in Senate Bill 783 together with provisions in the bill applying to the medical and dental professions.

1. The need of assuring an ample supply of meat and dairy products, and other foods of animal origin, which are essential in the nutritional well-being of the civilian population and military forces.

Today, fortunately, the United States has ample resources of animal food products. Our livestock industry is the largest and the healthiest of any nation. This is due to well-organized and administered veterinary agencies, both public and private, which have functioned to exclude or control animal-disease plagues that have hampered other nations.

The agencies that have made possible the unparalleled record of the United States in animal production and the safeguarding of animal-food products include:

(a) private practitioners of veterinary medicine who serve as the first point of contact and the first line of defense in the detection and control of communicable diseases of animals;

(b) the veterinary personnel of the U. S. Bureau of Animal Industry;

(c) the veterinary personnel of state livestock sanitary authorities;

(d) veterinarians employed by state and municipal departments of health for meat and milk inspection; and,

(e) Veterinary Corps of the Army, one of whose responsibilities is the inspection and safeguarding of most of the important food products used by the armed forces.

It is practically certain that for some time to come, the livestock industry of this country will be called upon to supply not only the greatly increased needs of our military establishment for all kinds of animal food products and the extra needs of the civilian population geared to the high expansion of industry for the national defense, but also a large amount of meat and dairy products for export. It would be a catastrophe to court the famine and pestilence here which have so commonly swept other countries during conflicts of lesser proportions than the one which is now almost world wide.

The introduction and spread of a serious

*Doctors and Medical Students Under Selective Service. Hearings before the Committee on Military Affairs, United States Senate. Seventy-seventh Congress, First Session on S. 783, March 18-20, 1941.

animal plague such as foot-and-mouth disease in this country, which is always a threat to be guarded against, could quickly disorganize and almost destroy the foundation of our main food supplies. Our veterinary agencies are the protection against such disasters. Without adequate, well-trained, veterinary agencies, both public and private, the threat of our national economy and national security is not simply an idle conjecture but a stark probability based upon reality.

It may be pointed out that the final break-up of the Central Powers in the last World War came about not so much through need of actual munitions of war as through morale-devastating lack, approaching famine, of foods for both civilian and military forces, particularly those of animal origin. We submit that the strength of the nation's military establishment and other measures for national defense will be no greater than the health and nutritional well-being of all our people; that ample supplies of food products from healthy animal sources are vital to the defense program; and that a properly husbanded and directed veterinary profession is fundamental to the whole problem.

2. The second great need is for a steady, uninterrupted influx of properly educated and highly trained veterinary graduates to supply the replacement needs of our veterinary forces, private and public. The veterinary personnel is relatively small, comprising some 10,000 graduate veterinarians in all fields of work. There are graduated each year only about 500 newly qualified veterinarians. This number even in normal times is barely sufficient to supply needed replacements due to deaths, retirement and other causes.

From 5 to 6 years or longer are now required to complete the training in veterinary medicine. Any interruption in the education of the present classes of veterinary students would inevitably lead to an acute shortage of properly qualified veterinarians in a short period. The shortage would be felt in every field of veterinary activity, the federal and state bureaus of animal industry, the Veterinary Corps of the Army, and so on through all ranks of the profession.

The compelling reason for including veterinary students in the provisions of Senate Bill 783 is evident. These young men are badly needed to complete their training as pointed out, yet they are the very ones most liable, from an age and physical fitness standpoint, to selection under the Selective Training and Service Act of 1940. Should the entire group be taken, it would mean the procurement of only about 2,000 effectives over the whole country.

We respectfully submit that no policy of the Selective Service Administration which would lead to the procurement of such a small number of effectives for training would be defensible in the face of the almost certain breakdown of the essential veterinary service due to lack of properly educated and trained replacements for the profession.

Many reasons for the inclusion of graduate veterinarians and veterinary students might be elaborated upon, if time permitted. However, even brief summary of them should bring recognition of the vital importance of maintaining fully adequate veterinary service throughout this period of national emergency, to wit:

(a) *The necessity for conservation of animal resources (cattle, horses, sheep, swine, poultry) and their products (meat, milk, cheese, eggs, hides, wool, glandular extracts, gelatin and others).*

(b) *The vital importance of adequate veterinary supervision over the health of animals as a public health measure.*

(c) *The need of effective meat and milk inspection services by qualified personnel in which the veterinary profession is outstanding.*

(d) *The preparation of biological products such as antitoxins and vaccines that are indispensable to public health and especially needed for the protection and immunization of the armed forces.*

(e) *The absolute necessity of guarding this country against the introduction and spread of animal disease plagues which might seriously threaten our whole livestock industry and the very base of our food supplies.*

In conclusion, may we state that wise planning now will safeguard against the possibility of future disaster. The American Veterinary Medical Association urges the passage of Senate Bill 783, amended to include graduate veterinarians and veterinary students, only to insure the utilization of qualified professional personnel to serve the nation's need to the best possible advantage.

Our association greatly appreciates the opportunity to present the above material to the members of the Senate Military Affairs Committee and we trust that the request to have graduate veterinarians and veterinary students included in Senate Bill 783 may receive favorable consideration.

s/ A. E. WIGHT, *President,*
American Veterinary Medical Association.
March 22, 1941

Statement by George W. Gillie, Congressman from Indiana

One of the most important functions of the veterinarian in the United States is the inspection of the meat and dairy products consumed by both the military and civilian populations. He is an important custodian, for he is responsible for the purity of these products. Individuals can only be as healthy as the food they eat.

The vital food inspection service is conducted by an army of trained veterinarians in

the employ of the federal, state and municipal governments. It is expanding each year and if war should come, it will be the duty of veterinarians in increased measure to protect the food supply of the nation. Food is precious in wartime and we must make doubly certain that animal diseases do not interrupt our supplies. We must make certain that the health of our army and of civilians is properly safeguarded through careful inspection of animal-food products.

Needless to say that if war comes we want no "embalmed beef" scandals and no decayed food for our armed forces. With a well-organized veterinary inspection service functioning as it should, we have a guarantee that this will not happen.

Like the other professions which have greater responsibilities in time of national emergencies, the veterinary profession is demonstrating that it is aware of its increased responsibilities in the national defense program and is responding to the challenge with splendid spirit.

The spirit is manifest not only in the Veterinary Corps of the Army, which is being expanded on a wartime basis, but also in the maintenance of a very highly efficient civilian veterinary service, dedicated to the safeguarding of the health of our animals and our families.

What a tragedy it would be, particularly during a great national emergency, should animal and human disease become rampant throughout the country. Against that possibility stands the veterinary profession of America.

The future of this profession and the health of Americans should not be endangered by wholesale drafting into the military service of veterinary students, teachers, and practitioners. For this reason I can not urge too strongly the necessity for including veterinarians on equal basis with doctors and dentists in the provisions of the Murray bill.

Statement of H. W. Schoening

I am connected with the American Veterinary Medical Association and would like to point out the fact that the veterinary profession is engaged in the control of animal diseases, which has a large bearing on the food supply of the country. There are a number of veterinarians engaged in practice as well as in official capacities with the various state and federal governments whose energies are directed to the control of diseases of animals. Any breakdown in the veterinary profession due to lack of veterinarians would have very serious consequences from an economic standpoint in this country.

As an example of that I heard a statement made yesterday by the secretary of the Norwegian legation to the effect that in Norway at the present time there is a very serious outbreak of foot-and-mouth disease due to the disruption of conditions of the veterinarians' essential place in European countries. As a result of this there has been an additional decrease in the available food supply in that country.

Our own country perhaps would be in the same position, with the veterinarians and the veterinarian supply dwindling to the point that they could not cope with the various activities now under their jurisdiction.

I think the veterinary profession is not very crowded by any means. Any additional shortage of veterinarians would react very disastrously, at some time or other, to the welfare of the country, particularly under the conditions existing at the present time. The veterinarians are not only engaged actively in the control of diseases in animals but also in research capacities in federal agencies and also throughout the states.

There are many problems still confronting the veterinary profession that need to be solved and one of the problems now is to obtain a sufficient number of qualified veterinarians to carry on this work. The demands that are being made on the profession by the Army are such that the profession is really in a serious situation from the standpoint of the adequate veterinary service needed in various parts of the country.

During the hearing the proposed amendments (rewordings) of the bill deferring veterinarians and veterinary students from selective training and service were inserted into the records. The report covers 178 printed pages containing pro and con discussions by prominent figures in the various branches of medicine. The societies and groups and their spokesmen presenting their views were:

American Medical Association, Morris Fishbein, *Editor*

American Dental Association, C. Willard Camalier, *Committee Chairman*

American Hospital Association, Claude C. Munger, *Committee Chairman*

National Health Defense Committee, Richard Lippman, *Chairman*

Association of Medical Students, Thomas Perry, *President*

American Veterinary Medical Association, A. E. Wight, *President*

Catholic Hospital Association, Alphonse M. Schwitalla, *President*

American Osteopathic Association, L. L. Gourley, *Attorney*

American Optometric Association, Harold Kohn, *Counsel*

American Association of Colleges of Pharmacy, H. E. Kendig, *President*

American Association of Dental Schools, J. T. O'Rourke

American Pharmaceutical Association, E. F. Kelly, *Secretary*

Selective Service System, Gen. L. B. Hershey, *Deputy Director*

War Department: Maj. I. P. Swift, *General Staff;* Col. R. A. Kelser, *Veterinary Corps;* Gen. L. C. Fairbanks, *Dental Corps;* Col. G. F. Lull, *Personnel Officer*, SGO.

A review of the documented proceedings shows that the Senate Committee on Military Affairs is deeply impressed over the prospect of dislocating the medical service of the country through unwise operations of the Selective Training and Service Act and on the other hand, that the War Department is equally perturbed over the blanket deferment of groups by legislative action, claiming that the local selective service boards are best qualified to judge their community's needs in so-called "necessary men," once (as Gen. Hershey pointed out) the 6,500 boards have been properly instructed as to their duties in that respect.

The veterinarians' situation was forcibly told as shown in the foregoing statements. In short, the functions of the veterinary profession are too far-reaching in the nation's commissariat and its numerical strength too small to justify a general disruption of its operations. The few soldiers the armed forces could gain would be outweighed by their absence from the field of food production and conservation. Pursuant to this train of thought comes the definite action taken by the national headquarters of the Selective Service System under date of May 12, 1941. The press release of May 19 which is a condensation of the official "Memorandum to all State Directors" issued by Deputy Director Gen. Lewis B. Hershey, follows:

National Headquarters

SELECTIVE SERVICE SYSTEM

Washington, D. C.

The veterinarian of today—as a primary guardian of the Nation's food supply—is a far cry from the "horse doctor" of the pre-automobile period but is an even more "necessary man," Brig. Gen. Lewis B. Hershey, deputy director of selective service, today told the state and local agents of the Selective Service System.

Recommending deferment from military training of veterinary doctors and students, General Hershey cited that surveys made by the Office of Production Management have revealed "a national overall shortage" in the profession that constitutes a menace to the success of the National Defense Program. He said:

"Reports from the Office of Production Management and from the War Department demonstrate that the veterinary profession constitutes an activity essential to the national health. A serious interruption or delay in its activity is likely to impede the National Defense Program."

OPM Surveys, General Hershey announced, have shown that there are approximately 12,000 veterinary doctors, graduates of colleges of veterinary medicine, who are practicing in the United States. The number has been practically static for ten years, and the graduates from the ten accredited veterinary colleges in this country have been only barely sufficient to offset deaths and retirements.

Somewhat more than 80 per cent of the practicing veterinarians, General Hershey said, are located in 14 major livestock states engaged in the protection of livestock. The other 20 per cent are engaged in the inspection and safeguarding of foods of animal origin—meat, poultry and dairy products.

In classifying individual veterinarians and individual veterinary students, General Hershey declared, local boards must keep first in mind the needs of their communities; but he stressed, they also must take into consideration the existing national overall shortage in the profession and the vital importance of the food and livestock industry to national health.

Local boards, he said, should give full weight, when classifying veterinary doctors and veterinary students, to the fact that the Army Veterinary Corps Reserve at present is of sufficient strength to fill current Army needs. If a local board, nevertheless, determines that any veterinary doctor should not be deferred, his attention should be called to the War Department's announcement that he should apply for appointment in the Veterinary Corps Reserve. Inductees who are accepted for Veterinary

Corps appointments, the War Department announced, will be ordered to extended active duty for a period of twelve consecutive months.

In urging the deferment from military training of each and every student "who gives reasonable promise of becoming a qualified veterinary doctor," General Hershey said:

"Currently, there are approximately 500 graduates entering the profession each year. This represents the only source of supply for future requirements necessary to supplement the present forces of the veterinary profession and to replace those leaving the profession. The shortage of veterinarians in the United States has caused several State colleges and universities which do not now have veterinary schools to consider establishing additional veterinary colleges."

There are no replacements for veterinary students who are withdrawn from school, General Hershey pointed out. Consequently, he said, if the supply of veterinary students who are graduated is reduced by their induction into military service in a nonprofessional capacity, an aggravation of the increasing overall national shortage will result.

The Veterinary-Medical Situation in Mississippi*

J. T. ALSTON, D.V.M.
Tupelo, Miss.

THE AUTHOR points out in a well-chosen brief the obstacles the farmers of his state had to surmount in transforming their one-crop system (cotton) to livestock production and the mixed farming that enterprise entails. There was foundation stock to purchase, buildings to erect, new crops to be raised, breeds to select, and new knowledge and experience to obtain in shifting from the one to the other. It is questionable whether all this can be achieved in one or even two generations in view of the tremendous capital required and the many significant details animal breeding and marketing involve.

Though the cattle industry of northwestern Mississippi is 90 years old, it is still in its infancy, hampered as it once was by Texas fever which, thanks to the veterinary service of our country, has been removed by the eradication of cattle ticks. While the veterinarian has been an instrument in this progress, in disease control he has been the leading figure—the champion.

With the transformation came disease of the animals about 25 years ago. Dairying in Mississippi is but 32 years old. Until then only a few Jerseys were kept for local and home production of milk. But being of excellent type the importation of good bulls, and crossing and recrossing with native cattle, raised the standard and it had a far-reaching effect.

Except for tick fever, there were no infectious diseases to interfere. Herds multiplied. Tuberculosis and brucellosis were not bothersome. Blackleg was rare. Deficiency diseases were unknown. Cattle rustled for a living in the winter and thrived on native grass in the spring, washed by rain and disinfected by sunshine. More than 95 per cent survived, escaping calf scours, navel-ill, pneumonia, tuberculosis, Bang's disease and worm parasites, although in the late winter they were sometimes a pitiful sight. The transformation to the bloom of good health in the spring was amazing. The minerals, vitamins, carbohydrate and adequate protein came from Nature's storehouse.

Then came the milk plants to give the dairy industry a boost by furnishing a market for milk products and encouraging people to raise better cattle and grow more and better feed. Cows, bulls and heifers were brought in by the carload from the Island of Jersey, Canada and the Eastern States. Bankers, merchants and others helped. This was but 14 or 15 years ago, a time too short for revamping the veterinary service to meet the new needs. It was not realized that it required more than blooded stock to make animal production

*Editor's abstract of a paper read at the 1940 meeting of the Mississippi Veterinary Medical Association, Vicksburg, Miss.

profitable. A fault was the importation of diseased animals from nearby states. Thus, the healthiest cattle-raising region east of the Mississippi became contaminated with contagious diseases. The very importers of these cattle were the first to howl that Bang's disease would ruin their business. Though they had muffed the opportunity to keep this disease out they now beckon from the house tops for the government and state to come in and drive it out, presumably by some wave of the magic wand. We strived to keep Bang's disease out and strived to educate farmers how it should be eliminated. Test and segregation, test and slaughter and now calfhood vaccination have been seized with all the despair of the drowning man grabbing for a straw. Judged from experiences of the past and present, I now expect to see Strain 19 peddled to Tom, Dick and Harry.

COMPETING SERVICES

A problem of no mean consequence to the livestock industry and the veterinary profession are the vendors of medical and biological products. There are laws purporting to prevent charlatans from practicing veterinary medicine but none to prevent quack remedies or remedies of merit from being sold to people who have no knowledge of their proper use. There are manufacturers who sell to graduate veterinarians only, others to veterinarians if they can, and others to anyone who will buy: farmers, stockmen, stock dealers, county agents, and quacks alike. Whether this is right or not, it is nevertheless true that a vast quantity of drugs and biological products go direct to the public for use without professional advice, and with them go advertisements, circulars, pamphlets describing their use. Drug stores also cater to this kind of trade. Their shelves are loaded with worm pills, tonics, stock powders, colic cures, hog-cholera serum and virus, blackleg vaccines, tetanus antitoxin, calcium gluconate, chloral, etc., etc. The owner makes the diagnosis and the druggist furnishes the treatment. Feed stores do likewise. High-pressure salesmen besiege the livestock industry and the makers of biological and chemical products flood the farmers with reports of the latest classical research in medical science. Even the veterinarian is duped by these "oily" salesmen and releases. With something to sell to a public waiting to be humbugged and ever looking for something miraculous and supernatural, the charlatans, quacks and parasites of human flesh are not overlooking the harvest to be gathered by playing up the field of medicine. This business is not concerned about ethics or the Golden Rule. It is a battlefield where the slogan is "get the business" without compunction about supplanting laudable undertakings, a battlefield where the general uses the most ruthless of weapons. As soon as a new medical discovery is made, the business world is quick to see its commercial possibilities. If it can be put into a pill, food, face powder, cigarette or chewing gum, the magic voice of the radio starts a hegira to the drug counter wondering how human life held out as long as it did. Even the cow must have it to sharpen her teeth, build her bones, brighten her eyes, purify her milk, tenderize her meat, and to pep up her strength that they may not die from drinking her milk or eating her flesh. Business, taking scientists at their word, makes capital out of deficiency disease and deficient soil, while the veterinarian tries to make a living by selling his service. But, can he survive against this competition? The only remedy I can conceive is to fight the enemy with his own weapons and tactics by selling good service and remedies of merit, bearing in mind that the first rule is to keep the confidence of the public. If driven to sell a remedy for 25 cents and give a dollar's worth of service free, the idea may pay on the long run.

The county agents and Smith-Hughes men are either friends or enemies. As enemies they can do us harm. As friends, they can help us. Shall we cultivate their friendship or shall we let them go on developing a competitive veterinary service for the people, that infringes upon our vested rights?

Departing from his general theme, the

Newer Developments in the Therapy of Shipping Fever in Cattle*

H. W. JOHNSON, D.V.M., and JAMES FARQUHARSON, D.V.M.
Fort Collins, Colo.

IT HAS BEEN observed that the incidence of disease among feeder cattle has increased. A study of the facts readily brings to light some of the causes of this change.

In recent years, the demand for smaller cuts of beef has changed the usual feeding of 2- and 3-year-old steers to that of steer calves and young heifers. Owing to this change, stockmen feed animals that are taken away from their mothers, brought in from the range and, before they can adjust themselves to feeding, are shipped to stockyards or directly to feedlots. This class of cattle is more susceptible to disease and less able to withstand the hardships of shipping than other steers. During their brief span of life on the range before they are exposed to the mass infection of stockyards and feedlots, they have little chance to develop immunity to disease. Another harmful factor is force feeding of concentrates to these young animals upon arrival and during their period of growth. One or more of these circumstances increase the disease problems seen in certain parts of the country today.

HEMORRHAGIC SEPTICEMIA

Hemorrhagic septicemia in cattle has been recognized as a disease since 1885 (Kitt), when a Pasteurella was found to be the causative agent. However, the bacteria observed in cattle affected with shipping fever in this section of the country have been numerous: diphtheroids, streptococci, staphylococci, with some cases negative. The Pasteurella organisms have been exceptional. We neither assert nor deny that there is such a disease as hemorrhagic septicemia, but when diagnosed as such, the presence of the organism should be confirmed in the laboratory because the mixed infection generally observed is Pasteurella-negative. Shipping fever is, therefore, the more appropriate name for the disease. Being more prevalent, although not more virulent, shipping fever causes a high death loss in feeder cattle.

Since recognized as a disease, various means of prevention and treatment have been employed. Some of these were thought to be specific, others were known to be empirical. During 1915 and even until the past few years, when cattle were stricken with the disease, the mortality was as high as 90 per cent. Today this percentage has been reduced to 100 per cent recoveries in some instances where medicinal treatment with good hygiene and sanitation is employed at the proper time and stage.

It seems appropriate to review some of the information gathered during the past 40 years on the prophylaxis and therapeutics of this complex disease.

When the Pasteurella organism was thought to be the specific agent, one of the first steps was the use of bacterin. Hemorrhagic septicemia bacterin was first produced in the early part of this century. Apparently it had some value as a protective agent against the Pasteurella group. It was, however, conceded that its value should not be overestimated, since outbreaks disappeared spontaneously. In 1915, Kinsley[1] stated that bacterin had some preventive property if given before the cattle were

*From the Department of Surgery and Clinics, Colorado State College; presented at the annual short course, Division of Veterinary Medicine, Colorado State College, Fort Collins, Colo., February 17-20, 1941.

[1]Kinsley, A. T.: Hemorrhagic septicemia. J. A. V. M. A., xlviii (1915), pp. 49-52.

(*Continued from preceding page*)

author spoke of the excellent result obtained in Mississippi from the use of phenothiazine in the treatment of verminous gastritis of calves.

shipped. In 1919, Hoskins[2] claimed that bacterin had considerable merit as an immunizing agent. The Committee on Miscellaneous Transmissible Diseases of the American Veterinary Medical Association (1927)[3] attributed some virtue to the use of bacterin in hemorrhagic septicemia. In 1932, the Kansas Agricultural Experiment Station[4] issued a report of considerable interest on the vaccination of cattle at stockyards before shipping them to the feeders and immediately after their arrival at the feedlots. The conclusions were that the mortality in cattle vaccinated at stockyards was higher than in unvaccinated animals and that the death rate of cattle vaccinated at their destination was even higher than among those vaccinated at stockyards. When vaccinated at stockyards and again upon arrival at feedlots, the death rate was increased between 7 and 8 per cent.

A few years ago 205 cattle were shipped to Fort Collins from Middle Park, Colo. Of these, 125 went to A, southwest of Fort Collins and 85 to B, east of Fort Collins. All of the animals of both lots were visibly sick three days after arrival. On the fifth day when the two herds were examined, A had lost two animals. Five of the acute cases were placed in a hospital pen and treated individually. The rest of the herd were left to proper shelter and sanitation. The owner requested that the herd be vaccinated, but this was not approved. One more animal died on the seventh day. The remainder of the herd recovered. Owner B insisted upon vaccination. Although this was done, nine of the vaccinated animals died within five days. [The mortality in A's unvaccinated herd was 2.4 per cent while that of B's vaccinated herd was 10.5 per cent.]

When to Vaccinate.—Vaccination seems to have value when done at the proper time and place, which is ten days before shipment[5] from the range or at the feedlot after a period of rest and adjustment to the new quarters and feed. In general, this should be after a period of two weeks. From information gathered and from our own experiences, vaccinating cattle at stockyards or in feedlots while they are in a susceptible state should be condemned. Mixed pulmonary bacterin in our hands has been the most effective in reducing the incidence of shipping fever.

Bacterins, Aggressins, Serums.—As bacterins have been used in treating shipping fever, their action should be considered. Shortly after administration, bacterins begin to build up immunity, that is, they stimulate the formation of antibodies. Since a few days are required to reach their maximum activity, animals already affected might be thrown into a negative phase. When this occurs the symptoms are aggravated and the disease takes an unfavorable course. If and when a bacterin produces a reaction, the effect is preventive, not curative.

Aggressins have been employed in preventing hemorrhagic septicemia.[6] They are believed to confer a more solid immunity than bacterins. They have, however, been employed less than the bacterin because the treated animals become more susceptible to the infection following the injection, presumably due to the presence of aggressins in the blood which later produce a relatively permanent immunity. Aggressin is, therefore, definitely contraindicated in the treatment of shipping fever.

Autogenous bacterin[7] has been used in controlling the disease. The bacterin is prepared from organisms obtained from animals that died of the disease. It seems that this product can be of considerable assistance in reducing the number of cases.

Anti-hemorrhagic septicemia serum has been considerably used and recommended. When hemorrhagic septicemia has been definitely diagnosed, this product should be specific. In this section, where other

[2]Hoskins, H. P.: Hemorrhagic septicemia in cattle with special reference to stockyards pneumonia. Vet. Med., xiv (1919), pp. 335-341.

[3]American Veterinary Medical Association, Committee on Miscellaneous Transmissible Diseases. J. A. V. M. A., lxx (1927), p. 953.

[4]Farley, H.: An epizoötiological study of shipping fever in Kansas. J. A. V. M. A., lxxx (1932), pp. 165-172.

[5]McConnell, W. C.: Cattle practice. J. A. V. M. A., xcvi (1940), pp. 695-703.

[6]Gochenour, W. S.: Hemorrhagic septicemia studies. J. A. V. M. A., lxv (1924), pp. 433-441.

[7]Kingman, H. E.: Personal communication.

organisms are present, it is not considered specific. Its use has been discouraging.

Drugs and Chemicals.—Ammonium chloride and carbonate are used extensively in the treatment of respiratory diseases. They are eliminated through the respiratory mucosa. They liquefy the bronchial secretion and thus facilitate its removal. These chemicals are of value in hastening recovery, when given in large doses every four to six hours.

Sodium bicarbonate was introduced by Hixon[8] in 1930 as a valuable therapeutic agent in this disease. He believes that there is a deranged acid-alkaline balance to correct. This sodium salt is given in an 8 per cent solution to obtain rapid alkalization. It is commonly used as a liquefying expectorant, as it dissolves the mucus of the catarrhal exudate. These actions in the alkalinity of the medium might account for the beneficial results. This treatment was employed extensively in this section, but in many typical cases its use has been discouraging.

Camphorated oil, intramuscularly, is said to be helpful in respiratory infections since it is somewhat expectorant, diaphoretic and stimulant to leucocytes. Apparently for these reasons it is being used by some veterinarians. Its main action, however, is that of cardiovascular stimulation.

Hydrochloric acid, intravenously, in a 1:1,000 to 1:1,500 solution has been recommended. The idea was to stimulate leucocytosis. This action is, however, doubtful. In the dose recommended there is but one drop of the acid to 1,000 drops of water [= 0.065 cc. to 62 cc.] which means that in the 250-cc. dose injected the patient gets but 4 minims of hydrochloric acid. This small amount does not seem sufficient to stimulate leucocytosis. It was, therefore, relegated to the shelf after passing through the fad stage.

Other medicinal agents that have been used are potassium dichromate, camphor, guaiacol and other drugs of doubtful merit too numerous to name.

[8]Hixon, R. W.: The handling of shipping fever from the practitioner's standpoint. No. Am. Vet., xi (1930), pp. 27-35.

Sulfonamide compounds (sulfanilamide,[9] neoprontosil,[10] sulfapyridine and sulfathiazole) have been highly rated as therapeutic agents in shipping fever. The results claimed for this group are variable. Sulfanilamide and sulfapyridine have been given a thorough trial at our clinic in shipping fever and its complication, bronchopneumonia. As the results were negative, their use was discontinued. The usefulness of sulfathiazole has not been proved. Since we have not had shipping fever caused by the Pasteurella organisms, we are not able to judge the value of these agents in that infection.

Creosote compounds have been employed for many years in all types of respiratory affections. Creosote is the most important of these products, the variety that was first obtained by Reichenback (1830) from beechwood. Its principal ingredients are guaiacol and cresol. Guaiacol, a phenol ester, was isolated by Behal and Ghesy (1887). Numerous derivatives have been brought out through attempts to overcome its toxic and irritating properties. Some of these are soluble and practically harmless. Of the water-soluble derivatives, the ones most readily obtainable are potassium guaiacol sulfonate and calcium guaiacol sulfonate. These esters must be saponified to liberate the active ingredient, guaiacol. If guaiacol or any of its esters is to have a direct action on any disease of the lungs, it is reasonable to expect that they will be excreted by them. Bufanini (1904) discovered that guaiacol, administered orally, was not excreted by the lungs. In 1915, Hofbauer showed that when injected hypodermically, guaiacol could be found abundantly in the blood, spleen and liver and a somewhat small amount in the lungs and kidneys. It is, therefore, evident that in order to get guaiacol into the lungs, it must be given intravenously or hypodermically.

Since guaiacol is irritant when given

[9]Glenney, W. C.: So-called shipping fever in dairy cattle. J. A. V. M. A., xcvi (1940), pp. 481-485.

[10]Stearns, T. J.: Shipping fever in cattle complicated with pneumonia. J. A. V. M. A., xciv (1939), pp. 654-655.

hypodermically, intravenous administration is preferable. When either one of the guaiacol derivatives is injected intravenously, small amounts of guaiacol can be recovered from the respiratory mucous membrane. It is evident that to obtain the excretion of large amounts through the respiratory mucus, free guaiacol should be injected intravenously. Inasmuch as guaiacol is insoluble in water, the derivative used is first suspended in ethyl alcohol. The guaiacol can then be dissolved in an aqueous solution of sodium iodide. This solution is stable. It can be kept for months in a dark bottle before the guaiacol will precipitate. The article by Nammack and Tiber[11] on potassium guaiacol sulfonate (thiocol) led us to employ this guaiacol derivative in the treatment of shipping fever. The preparation as modified by us is as follows:

Potassium guaiacol sulfonate.....	5 Gm.
Ethyl alcohol, 95%.....	10 Gm.
Sodium iodide	5 Gm.
Sterile water	90 Gm.

The dose varies from 75 to 150 cc.: calves of 300 lb. or less, 75 cc.; calves weighing 400 to 600 lb., 125 cc.; larger cattle, 150 cc.

According to Nammack and Tiber (*loc. cit.*), guaiacol can be recovered from the sputum of the human being in large quantities at the end of 24 hours; in lesser quantities in 48 hours, and in some instances, some can be recovered as late as 72 hours. It is, therefore, recommended that cases which do not respond be retreated in 48 hours.

We first used this treatment on a calf belonging to the Animal Husbandry Department of Colorado State College in the fall of 1939. The animal had been sick with typical shipping fever for 24 hours. The results obtained from this medication were miraculous. There was considerable improvement in 24 hours and a return to normal in 36 hours. In numerous cattle treated during the past two years the recoveries amounted to nearly 100 per cent.

[11]Nammack, C. H., and Tiber, A. M.: The treatment of lung abscess by means of guaiacol intravenously. J. A. M. A., cix (1937), pp. 330-338.

In true cases of bronchopneumonia guaiacol has been of little value. Its use has been discontinued in that complication. The best results are obtainable in the early stages. Feeders of cattle are familiar with this disease. They recognize it immediately.

Symptoms. — Affected animals stand apart from the herd. They do not follow at feeding time and stand with the head down, ears dropped and breathing rapidly. The temperature varies from 105 to 107.5 F.

When guaiacol is used intravenously, these symptoms can be aborted in practically 100 per cent of the treated cases. The temperature drops 2 to 3 degrees in 24 hours. The drop is accompanied by considerable improvement in the symptoms. A great many of the sick are back on feed in 36 to 48 hours. Animals sick for a longer period must be watched for the possible appearance of bronchopneumonia. When this occurs the results from the treatment are less encouraging. In some cases of shipping fever there is a "necrophorus" infection of the liver. Invariably this complication is fatal.

In developing various treatments for shipping fever, the administration of potassium guaiacol sulfonate became the method of choice.

The conservation of food by eliminating and rationing all nonagricultural animals ranks among the major projects of Britain at the present time. Veterinarians not engaged in practice among agricultural animals are placed in the "Schedule of Reserved Occupations."

Animaldom is the name of a worthy four-page monthly published by the Pennsylvania Society for the Prevention of Cruelty to Animals. The price is but 25 cents a year and no issue is without interest to those in veterinary or humane work.

The use of rayon in the making of blankets and other fabric materials is said to be a major invasion on the wool market.

The Transmission of Anaplasmosis by Mosquitoes (Culicidae)*

D. E. HOWELL, B.S., M.D., Ph.D., GEO. W. STILES, B.S., M.D., Ph.D., and LEWIS H. MOE, D.V.M., M.Sc.

THE ROLE played by ticks in the transmission of anaplasmosis was appreciated soon after the disease was recognized as a separate entity by Theiler in 1910.[1] Subsequent work has incriminated at least 17 species of ticks as vectors, either congenitally from parent to offspring through the egg or simply from stage to stage.

Sanborn *et al*[2] reported the first successful transmission by insects when they were able to transfer the disease from a sick to a healthy animal by a composite sample of tabanids. Two years later they reported on four more cases carried by flies.[3] A recent report from this station (in press) indicates that at least 7 species of horseflies can transmit the disease. Either clinical or carrier cases may provide the infecting feed.

Several attempts have been made to transmit anaplasmosis by other insects. Mohler[4] reports that a considerable number of *Aedes aegypti* were fed on a carrier of anaplasmosis and nine days later on a susceptible cow, but transmission did not occur. Sanders,[5] Julius *et al*[6] and Taylor[7] have used large numbers of *Stomoxys calcitrans* (Linn) but only Sanders[5] reports successful transmissions. Unsuccessful attempts with Haematobia (Lyperosia), Haematopota and Chrysops are recorded.

Mosquitoes are frequently present in large numbers on cattle during the anaplasmosis season. Some of these, especially members of the genus Psorophora, breed in temporary pools found in the pastures where the cattle are grazing. These mosquitoes are vicious biters and occasionally occur in large enough numbers to cause death (Bishopp[8]).

Inasmuch as mosquitoes are proven vectors of many diseases, such as malaria, yellow fever, equine encephalomyelitis, dengue, bird malarias and fowl pox, and there is some epizoötiological evidence suggesting that they may play a part in the transmission of anaplasmosis, it seemed advisable to set up experiments designed to test their ability to transmit this disease.

MATERIALS AND METHODS

All experimental work was conducted in an isolation barn built expressly for anaplasmosis transmission work. Animals kept in this barn over two years have never shown anaplasmosis except when the disease was experimentally induced.

The cattle used in this experiment were purchased at a public sale and kept in the barn several weeks to eliminate the possibility of a previously contracted case of anaplasmosis that would give erroneous results.

Mosquitoes were obtained as pupae in pastures used by a college dairy herd. These pupae were brought into the barn and allowed to emerge as adults in small cages. The small number of *Aedes aegypti* (Linn) used were raised in the laboratory. The pools from which pupae were obtained for experiments Nos. 251 and 253 contained almost pure cultures of *Psorophora columbiae* (Dyer and Knab) and *P. ciliata*

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*This is a coöperative project conducted by the Oklahoma Agricultural Experiment Station and the Bureau of Animal Industry of the U. S. Department of Agriculture. Representing the former are D. E. Howell, Assistant Professor of Medical Entomology, and Lewis H. Moe, Associate Professor of Veterinary Science. The Bureau of Animal Industry is represented by Geo. W. Stiles, Bacteriologist in Charge of the Branch Pathological Laboratory, Denver, Colo.

[1]Theiler, A.: *Anaplasma marginale* (gen. & spec. nov). The marginal points in the blood of cattle suffering from a specific disease. Rept. Govt. Vet. Bact. Dept. Agri. Transvaal. S. Africa, 1910.

[2]Sanborn, C. E., G. W. Stiles, L. H. Moe and H. W. Orr.: Transmission of anaplasmosis by flies. Okla. Agri. Exp. Sta. Rept. 1926-30, pp. 254-264.

[3]Sanborn, C. E., G. W. Stiles and L. H. Moe: Preliminary experiments in the transmission of anaplasmosis by horseflies. Okla. Agri. Exp. Sta. Bul. No. 204. 1932.

[4]Mohler, J. R.: Report of the Chief of the Bureau of Animal Industry, 1934. Page 38.

[5]Sanders, D. A.: Notes on the experimental transmission of bovine anaplasmosis in Florida. Jour. Am. Vet. Med. Assoc. lxxxiii (1933) pp. 799-805.

[6]Julius, G. A.: Australian Council Sci. and Industrial Res. Annual Rept. 8, 1934. pp. 16-23.

[7]Taylor, E. L.: An attempt to transmit anaplasmosis by British biting flies. The Veterinary Bulletin. v (1935), pp. 413.

[8]Bishop F. C.: Mosquitoes kill livestock. Science lxxvii (1933), pp. 115-116.

(Fab), so no attempt was made to eliminate possible contaminators.

Because the pupal stage of Psorophora is very short during warm weather, it was possible to use large numbers of mosquitoes all of approximately the same age. These were kept unfed for three days to assure a fair percentage of bites. They were supplied with water, however, and the relative humidity was kept above 80.

The mosquitoes were fed in cages consisting of short style lantern globes covered at both ends by a bobbinet, an open perforated fabric which permits easy feeding yet is durable and prevents escape. A small hole is cut in the cloth to allow for the introduction and removal of mosquitoes. This is plugged by a soft cotton roll which makes possible the entrance of a sucking tube without removal. The hole closes as soon as the tube is removed.

Transfer of mosquitoes was accomplished by means of the ordinary adult mosquito collecting tube operated by mouth. When reasonable care was exercised, very little injury was noted.

Mosquitoes were infected by applying an end of a feeding cage containing hungry mosquitoes to the skin of an animal with anaplasmosis and allowing them to feed to approximately half repletion as determined by the swelling of the abdomen. If they were really hungry and nearly 100 per cent fed at once, it was possible to transfer the entire group as a unit; otherwise, they were quickly moved singly by means of a sucking tube to a similar cage on the second cow. No bite was counted until the mosquito fed to repletion on the second cow.

After feeding, the mosquitoes were returned to their stock cages and used again when hungry. Their species was determined after death.

EXPERIMENTAL DATA

Case No. 230.—Five species of Psorophora, *P. columbiae* (Dyer & Knab), *P. signipennis* (Coquillett), *P. cyanescens* (Coquillett), *P. ciliata* (Fab) and *P. discolor* (Coquillett), involving a total of 494 individuals were partially fed upon carrier No. 217 and immediately transferred to No. 230 where they were allowed to feed to repletion. These mosquitoes were kept three days and again re-fed on both animals. Those which would bite were given a third feeding on the sixth day. The details of this experiment are shown in the table. This experiment was negative although No. 230 was subsequently shown to be susceptible.

Case No. 251.—On June 19, 1940, eight *P. ciliata* and *P. columbiae* mosquitoes were fed until approximately one-half replete on No. 239, a cow that was convalescing from anaplasmosis. These half fed mosquitoes were then allowed to complete their feeding on No. 251. The following day over one hundred mosquitoes were fed on No. 239, and on June 21 and 23 fifty and forty plus respectively were fed on No. 239, then on No. 251, to complete their feeding. Between June 28 and July 1, twenty-one *Aedes aegypti* were fed on No. 242, a clinical case which later died of anaplasmosis, and immediately afterwards on No. 251. On July 9 twenty-two more *P. ciliata* were partially fed on No. 242 and completed on No. 251.

A definite rise of temperature was noted in No. 251 on August 15; and Anaplasma bodies were numerous August 17, fifty-eight days after the first bite or thirty-eight days following the last feeding. This was a typical case of anaplasmosis which recovered.

Case No. 253.—This animal received bites from *P. ciliata* and *P. columbiae* mosquitoes, which obtained their infective feed from a clinical case of anaplasmosis, during July 10, 11 and 12—approximately 525, 750, and 250 respectively, a total of 1,525 bites. These figures are approximate because the feeding methods did not permit an exact count of the mosquitoes which fed.

Thirty-eight days after the first feeding, smear preparations were positive, a definite rise in temperature was noted, with icterus and other symptoms of anaplasmosis.

DISCUSSION

Occasional cases of anaplasmosis occur during the summer months which can not be traced to mechanical transmission resulting from herd management and where the probability of tick or horsefly transmission is very remote. Epizoötiological evidence suggests that mosquitoes, especially those belonging to the genus Psorophora, may be the vectors in these cases.

Most members of this genus are temporary pool breeders which develop from eggs laid before the pool was filled with water. The eggs may remain dormant for long periods of time until conditions become favorable for their development. As a result, they are able to appear as larvae in huge numbers a short time after the water collects in the pools. These larvae develop rapidly and may emerge as adults in less than a week, the exact time depending upon the temperature and food conditions. This makes possible the production of huge numbers of adults which are closely associated with cattle and will feed voraciously on them during the anaplasmosis season.

CASE 230

SPECIES OF MOSQUITO	STATE OF INFECTING ANIMAL	DATE OF FEEDING	NUMBER FED	TOTAL	GRAND TOTAL	RESULTS
Psorophora columbiae	Carrier	June 18	132			
Psorophora columbiae	Carrier	June 21	46			
Psorophora signipennis	Carrier	June 18	115	178		
Psorophora signipennis	Carrier	June 21	14			
Psorophora cyanescens	Carrier	June 18	41	129		
Psorophora cyanescens	Carrier	June 21	24			
Psorophora ciliata	Carrier	June 18	35	65		
Psorophora ciliata	Carrier	June 21	30			
Psorophora ciliata	Carrier	June 23	50			
Psorophora discolor	Carrier	June 23	7	115		
				7	494	Negative

CASE 253

SPECIES OF MOSQUITO	STATE OF INFECTING ANIMAL	DATE OF FEEDING	NUMBER FED	TOTAL	GRAND TOTAL	RESULTS
P. columbiae and P. ciliata	Clinical	July 10	525			
P. columbiae and P. ciliata	Clinical	July 11	750			
P. columbiae and P. ciliata	Clinical	July 12	250		1525	Positive

CASE 251

P. ciliata and P. columbiae	Clinical	June 19	8			
P. ciliata and P. columbiae	Clinical	June 20	100			
P. ciliata and P. columbiae	Clinical	June 21	50			
P. ciliata and P. columbiae	Clinical	June 22	40			
Aedes aegypti (Linn.)	Clinical	June 28	3			
Aedes aegypti (Linn.)	Clinical	June 29	10			
Aedes aegypti (Linn.)	Clinical	July 1	8			
P. ciliata	Clinical	July 9	22	241		Positive

In the experiments described large numbers of mosquitoes were used, all of which were collected in pastures used regularly by cattle. All mosquitoes were transferred immediately from the infected animal to the susceptible one because horsefly experiments had indicated that insects remain infective for only a short period of time. In cases No. 251 and No. 253, where the infective feed was obtained from a clinical case, positive results were obtained, but No. 230, fed on by mosquitoes from a carrier cow, was negative. This agrees with the work with horseflies, where much larger numbers of flies were required to effect transmissions when carriers were used as the source of infection.

No evidence of biological transmission was obtained in these or preceding experiments (unpublished data), and it seems probable that a purely mechanical transmission by contamination of the wound is involved.

As a result of this experimental work, it seems safe to state that mosquitoes may transfer anaplasmosis from sick to healthy animals but it is likely that large numbers are required and that conditions must be favorable. The probability of a successful transfer is much less if carrier animals are used. The authors feel that Psorophora may be the most important mosquitoes in anaplasmosis transmission because of their large size, close association with cattle and presence in huge numbers. It should be stressed, however, that probably no mos-

Further Investigations of Rumen Gases and Bloat in Ruminants*

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SINCE PREVIOUS work[1, 2] indicates that the character of the gas produced has a marked influence on the symptoms and prognosis of acute tympanitis or bloat in ruminants, it was felt that additional studies should be made of these gases, their physiologic effects and possible sources.

Improved analytical methods have made it possible to make a more careful study of carbon monoxide, both from the standpoint of amounts existing in the rumen gas of normal animals and the amount necessary to induce symptoms in experimental animals.

Hydrogen sulfide was reported in rumen gas as early as 1858 by Hering,[3] although apparently no studies have been made of its physiologic effects when absorbed from the rumen.

The work during the past year has included studies of (1) the amounts of carbon monoxide (CO) and hydrogen sulfide (H_2S) found in rumen gas and ingesta obtained from normal animals and one experimental animal with a rumen fistula, (2) the effects of insufflation of these gases into the rumenoreticular cavity of normal sheep and one experimental cow with a rumen fistula, (3) the possible substrate and bacterial sources of these gases, (4) the effects of various feeds on the existing amounts of these gases and (5) the effects of extreme pressures in the rumenoreticular cavity of sheep and one experimental cow.

*Technical paper No. 349 of the Oregon State Agricultural Experiment Station, contribution from the Department of Veterinary Medicine; presented before the Section on General Practice at the 77th annual meeting of the AVMA, Washington, D. C., August 26-30, 1940.

[1]Cole and Hart: Preliminary report made before the western section of the American Society of Animal Production (1937).

[2]Dougherty, R. W.: Physiological studies of induced and natural bloat in dairy cattle. J.A.V.M.A., xcvi (Jan. 1940), pp. 43-46.

[3]Cited by Lungwitz: Arch. f. Tier., xviii (1892), pp. 80-110; xix (1893), pp. 75-80.

(*Continued from preceding page*)

quitoes are important factors in the spread of this disease and that they can be responsible for transmission in only a few cases.

SUMMARY

Transmission of anaplasmosis by arthropods is reviewed.

Two positive cases of mosquito transmission by Psorophora mosquitoes are reported.

A single case was negative when the mosquitoes obtained their first feed from a carrier.

The possible importance and mode of transmission by mosquitoes is discussed.

EXPERIMENTAL PROCEDURE

Gas samples were taken from normal cows by means of a stomach tube connected to a gas-sampling burette. The end of the stomach tube to be passed into the rumen was sealed with a No. 10 gelatin capsule, weakened slightly on the tip end with a file. After being placed over the end of the tube the base of the capsule was sealed to the tube with paraffin. This system was evacuated with a water pump and then the tube was passed into the rumen. In one or two minutes the weakened end of the gelatin capsule dissolved and the gas rushed into the system. The open stopcock of the gas-sampling burette was closed, confining a representative sample of rumen gas in the burette. At first the gas was analyzed for CO and H_2S, but soon H_2S analyses of the gas were abandoned, since the liquid portion of the rumen ingesta contained much more H_2S than the gas. Carbon-monoxide determinations were made by the iodine-pentoxide method. Gas was run through the apparatus at the rate of 500 cc. per hour, the iodine pentoxide being kept at 150 C. The liberated iodine was sucked into an evacuated flask, being absorbed by the KI solution. The free iodine was titrated with standard thiosulfate. This test is accurate.

Carbon monoxide in rumen gas obtained from normal cows ranged from 0.0 per cent to 0.00309 per cent by volume. Seven samples were obtained from four cows. Only one sample did not contain monoxide.

After the gas sample was taken, a small amount (200 to 300 cc.) of liquid ingesta was pumped out of the rumen and analyzed for H_2S content.

The following procedure was used in analyzing the rumen ingesta for H_2S content:

The ingesta were placed in a 100-cc. test tube, acidified with N/6 sulfuric acid and air

drawn through the liquid into an evacuated flask containing 5 cc. of N/50 iodine solution. After vigorous shaking the excess iodine was titrated with standard thiosulfate (0.01 N).

The H_2S content varied from 0.0315 cc. to 0.115 cc. per 100-cc. sample.

Three of these animals were on dry feed and the others were on grass pasture (table I). Two of the animals on dry feed, poor quality oats and vetch hay were changed to freshly cut green alfalfa. Carbon-monoxide and hydrogen-sulfide determinations were made two days later. One H_2S determination was made on gas from one cow three days later.

TABLE I

Samples taken while animals were on dry feed:

Cow No.	H_2S per 100 cc. Ingesta	CO in Rumen Gas % by Volume
373	0.0315	0.00309
358	0.0563	0.00232

Two days later after being put on freshly cut green alfalfa:

Cow No.	H_2S per 100 cc. Ingesta	CO in Rumen Gas % by Volume
373	0.171	0.00232
358	0.0945	0.00232

Three days after being put on freshly cut green alfalfa:

Cow No.	H_2S per 100 cc. Ingesta	CO in Rumen Gas % by Volume
358	0.119	CO determination not made

Numerous analyses were made of gas and rumen-ingesta samples taken from the rumen-fistula cow. Carbon-monoxide content ranged from 0.0 per cent to 0.17 per cent by volume. Hydrogen-sulfide content of the ingesta varied from 0.02 to 0.309 cc. per 100 cc. of ingesta.

In these experiments it was noted that the type of feed being ingested had a marked influence on the amount of H_2S present. When the animals were fed good quality legume hay, the H_2S content was greatly increased. Carbon-monoxide variations were noted, but could not be correlated with changes in feed.

In the second phase of these experiments, the effects of insufflation with varying amounts of CO and H_2S were noted in a rumen-fistula cow.

Twenty-five hundred cubic centimeters of CO (made from the action of sulfuric acid on formic acid) was forced into the rumenoreticular cavity through a valve in the pressure plug. When this amount of gas was forced in slowly for a period of twelve minutes, symptoms were noted, but they were not as severe as those noted when CO was forced in at the rate of 2,500 cc. in three minutes. The rate at which gas accumulations occur in the rumenoreticular cavity has an important bearing on gas absorption. The effect of increased pressure-increasing rate of absorption has been previously reported.[3] When 2,500 cc. of CO was forced in through the ingesta in three minutes, practically no symptoms were noted and the CO content of the rumen gas increased only slightly.

When 2,500 cc. of CO was forced into the top part of the rumen in three minutes, the animal collapsed. Immediately after collapse a blood sample was taken and it was found to be 60 per cent saturated with carbon monoxide. Recovery was rather slow. Carboxyhemoglobin percentage determinations were made after the method of Sayers and Yant.[4]

Hydrogen-sulfide insufflations produced striking results. Two sheep were used in the first experiment. Eight hundred cubic centimeters of H_2S was forced into the rumen of a large ram slowly under a low pressure and then the intrarumenal pressure was increased slightly by forcing air into the organ. The sheep died within two minutes. Four hundred cubic centimeters of H_2S was forced slowly into the rumen of another sheep and a small amount of air added. The animal recovered after showing symptoms of anoxemia.

In a series of approximately 20 H_2S insufflations into the rumen-fistula cow, it was noted that the amount of H_2S necessary to cause prostration was highly variable, ranging from 400 cc. to 1,400 cc. When being fed poor quality hay and when the rumen contents were dry, the animal could tolerate comparatively large amounts of H_2S. When the animal had been fed good quality legume hay or freshly cut ladino clover or alfalfa, and the rumen contents were moist, the H_2S tolerance was low. As was noted with CO insufflations, the rapidity with which the gas was forced into the rumen had a marked influence on the symptoms noted. No difference was observed in the manner of H_2S insufflation, *i.e.*, whether the gas was forced through the ingesta or injected into the rumen gas. The animal recovered much more rapidly from H_2S intoxication than from CO intoxication. When the intrarumenal pressure was increased with air immediately after H_2S insufflation, the H_2S tolerance was very low.

During one of the H_2S insufflation trials, determinations were made of the H_2S content of the rumen gas and ingesta at the time the animal collapsed. Samples were taken just after collapse. The gas contained 0.0716 per cent H_2S

[4]Hawk and Bergheim: Physiological Chemistry (P. Blakiston's Son & Co., Philadelphia, 1937).

by volume and the ingesta 0.322 cc. per 100-cc. sample.

The third phase of experimental procedure included *in vitro* and *in vivo* studies of CO and H_2S formation and attempts to isolate characteristic H_2S- and CO-forming organisms.

Samples of rumen contents were taken and placed in 2,000-cc. flasks in a water bath at 37 C. The gas evolved was allowed to bubble through 10 per cent lead acetate. A large amount of precipitate indicated the production of fairly large quantities of H_2S in the ingesta. The experiment was continued for a period of 24 hours. When suction was applied to the system, the production of H_2S was greatly accentuated.

Flasks containing rumen ingesta to which cystine, methionine and potassium sulfate had been added all showed a marked increase in H_2S production over the control flasks.

In vitro H_2S production determinations were as follows:

October 31, 1939 (some error due to back wash)

1) Control—Rumen contents in 2-liter flask ¾ full
   0.0623 Gm. $PbSO_4$
   0.00698 Gm. H_2S = 4.60 cc. H_2S
2) Above—3 Gm. K_2SO_4
   2a—1st 12 hours = 0.1957 Gm. $PbSO_4$
   2b—2nd 10 hours = 0.1510 Gm. $PbSO_4$
   22 hours = 0.3467 Gm. $PbSo_4$
   0.3859 Gm. H_2S = 25.65 cc. H_2S
3) Above—1 Gm. cystine
   0.6790 Gm. $PbSO_4$
   0.0762 Gm. H_2S = 50.2 cc. H_2S

November 1, 1939

4) Rumen contents—2-liter flask over ½ full
   0.2566 Gm. $PbSO_4$
   0.0288 Gm. H_2S = 18.97 cc. H_2S
5) Above—½ Gm. cystine
   0.7745 Gm. $PbSO_4$
   0.0866 Gm. H_2S = 57.05 cc. H_2S
6) Above (4)—0.2 Gm. methionine =
   0.0956 Gm. H_2S = 76.5 cc.
   0.3826 Gm. $PbSO_4$
   0.04267 Gm. H_2S = 28.11 cc. H_2S

In vivo experiments with the rumen-fistula cow gave similar results. Five hours after the injection of 2.5 Gm. of cystine into the rumen, the H_2S in the ingesta had risen from 0.226 cc. per 100-cc. sample to 0.502 cc. per 100-cc. sample.

The following day when rumen ingesta yielded 0.27 cc. per 100-cc. sample, 5 oz. of elemental sulfur was put into the rumen in two doses, 3 oz. in the first and 2 oz. in the second, three hours apart. Fifteen hours later a 100-cc. sample of rumen liquid yielded 0.312 cc. of H_2S.

Several days later elemental sulfur was added in a 4-oz. dose, raising the H_2S content from 0.188 cc. per 100-cc. sample to 0.242 cc. per 100-cc. sample. The second sample was taken five hours after the sulfur was placed in the rumen.

A culture of H_2S-forming organisms was isolated with Cliffton's media to which cellulose, cystine and a small amount of dextrose had been added. After three transfers the culture was practically pure—a small, faintly staining, Gram-negative rod. When cystine was added to the culture, H_2S was rapidly produced.

One-liter doses of this culture were given to three sheep. One sheep was given culture alone; a second, culture plus 1 Gm. of cystine; and a third, culture plus 1 Gm. of cystine plus glucose. A fourth sheep was given 1 Gm. of cystine plus glucose. No symptoms were noted.

Unsuccessful attempts were made to increase CO formation *in vivo* and *in vitro* and to isolate CO-forming organisms.

The influence of feed on H_2S production in the rumen has been demonstrated both with normal animals and the rumen-fistula animal. The ingesta H_2S of the latter animal has been increased 7½ times by changing from poor quality hay to freshly cut green alfalfa. No attempt has yet been made to demonstrate that the cystine and methionine content of plants is responsible for this increase.

The last phase of experimental procedure to be described includes additional work on the effects of extreme pressures in the rumenoreticular cavity.

Extreme pressures of air were established in anesthetized sheep and maintained for periods up to 20 minutes. There was a rise in blood pressure and an increase in heart rate, but the heart's action could not be stopped in this manner.

A maximum intrarumenal pressure of 110 mm. of mercury above atmospheric pressure was established and maintained for about five minutes in the rumen-fistula cow, without permanent damage. During one air-insufflation experiment a pressure of 140 mm. of mercury was maintained for approximately two minutes. Air was forced into the rumen through an intrarumenal extension on the pressure plug. This forced the air up through the ingesta. It took much less air to increase the intrarumenal pressure than when the air was forced into the top part of the rumenoreticular cavity. Eructation was also more difficult. This change in method of air insufflation was made in order to stimulate the natural method of gas production in the rumen.

One attempt was made to determine the mode of action of CO in paralyzing the rumen wall. Carbon monoxide was injected into the rumen of a sheep, under nembutal anesthesia, until the rumen showed practically no motility. The isolated vagus (left) was stimulated with a

make-and-break current and the rumen became extremely motile.

DISCUSSION

This work was undertaken in order that some of the information so gained will be applicable to a more careful study of actual cases of acute tympanitis. If bloat in ruminants can eventually be prevented or controlled effectually, it will permit the unrestricted use of legume pastures. In certain sections the use of such pastures is attended with considerable danger.

It is significant that two toxic gases are commonly found in the normal rumen gas and that the concentration of one of these gases, hydrogen sulfide, can be increased quite consistently by feeding alfalfa and ladino clover, two legumes that are often incriminated as causing bloat.

A common premise that excessive intra-rumenal pressure causes death in bloat is inadequate. It is quite likely that pressure, the character of the gas, rate of gas formation, physical qualities of the ingesta and individual susceptibility all share in the responsibility for death.

The rapid hydrogen-sulfide production when cystine is added to the ingesta, *in vivo* and *in vitro*, indicates that there may be complete or nearly complete destruction of cystine when fed orally to ruminants. This may explain the failure of cystine, when fed orally, to increase lactation in the dairy cow fed alfalfa hay.

Recent *in vitro* experiments have emphasized two important points. A series of trials were conducted in which ingesta were taken from the rumen and placed in 2,000-cc. flasks. Cystine was added to one flask and the other was used as a control. Total gas production, as well as the H_2S increase, was measured.

There was a correlation between H_2S production and the kind of feed the animal received several days prior to the experimental period. When the cow was fed poor quality, non-legume hay, the H_2S response was only moderate. When freshly cut alfalfa or ladino clover was fed, the H_2S response was much greater.

Twice during the *in vitro* experiments the total amount of gas, as well as H_2S production, was greatly increased when cystine was added to the flasks.

On July 29, a heifer in the college dairy herd died of bloat. This animal had been on the same irrigated ladino clover pasture for six weeks prior to that date.

Samples of gas, ingesta and blood were taken a few hours after death. A post-mortem examination was performed after removing the ingesta and placing it in the rumen of the rumen-fistula cow. The ingesta were light and "frothy." A few sub-pleural, subperitoneal and subepicardial hemorrhages were noted. The lungs were passively congested, especially the anterior lobes. No other lesions were noted.

SUMMARY OF CHEMICAL ANALYSES

Rumen ingesta....0.441 cc. H_2S/100 cc. ingesta
Rumen ingesta (6 hrs. later).....
.....0.33 cc. H_2S/100 cc. ingesta
(This was kept sealed in a fruit jar at room temperature)
Rumen gas .....
..0.1505 cc. H_2S/100 cc. gas (350-cc. sample)
Abomasum ingesta (6 hrs. later).....
.....0.352 cc. H_2S/100 cc. ingesta
Abomasum gas (6 hrs. later).....
.....0.15 cc. H_2S/100 cc. gas
Large intestine gas (6 hrs. later).....
.....0.247 cc. H_2S/100 cc. gas
Carbon-monoxide content of rumen gas.....
.....0.0125 cc. CO/100 cc. gas

The H_2S content of this material was much greater than the level considered to be toxic to one experimental cow under average conditions.

The total blood sulfur was approximately four times the amount normally found in blood.

CONCLUSIONS

1) Repeated determinations have revealed the presence of carbon monoxide in rumen gas obtained from experimental cows. The percentages of CO ranged from 0.0 to 0.17 by volume.

2) Hydrogen sulfide has been found in rumen gas as much as 0.03 per cent by volume, and in rumen ingesta as much as 0.309 cc. per 100 cc. of ingesta.

3) Feeding good alfalfa hay and freshly

cut ladino clover and alfalfa increased the H_2S content of the rumen ingesta.

4) No correlation was found between carbon-monoxide variations and feed changes.

5) Small amounts of H_2S and CO were toxic when injected rapidly, followed by air insufflation, which caused an increase in intrarumenal pressure.

6) Both gases caused a distinct paralysis of the organ when sufficient concentrations were reached in the rumen.

7) In both *in vitro* and *in vivo* studies, cystine, methionine and inorganic sulfur all caused an increase in H_2S production.

8) Comparatively large amounts of H_2S were found in gas and ingesta taken from a heifer that died of bloat.

Brucellosis in Zebu Cattle

Brucellosis has been observed in zebu cattle (*Hissar ongole*) since the beginning of the century on estates in East Sumatra. The main damage was not from abortion, but from chronic, relapsing joint affections.

In 1927, Bransvald announced a relationship between the syndrome of joint affections and abortion and orchitis in males. *Brucella abortus* was isolated by him from the seminal vesicles, but not from the synovia of the affected articulations. Mineral deficiency in the food was thought to be the cause. As the disease spread, further investigations were carried out. Three animals affected with "thick knee" disease were examined clinically, pathologically and bacteriologically at the Veterinary Institute, Buitenzorg, Java. Organisms were found in the periarticular connective tissue, but not in the synovia. Dead and living *Onchocerca bovis* also were isolated in the same tissues. The author believes it is not improbable that these parasites form sites for the penetration of Brucella organisms.

In typing the organisms by means of aniline dyes, it was found that they were not materially affected in growth by suitable concentrations of thionin, crystal violet, basic fuchsin and methyl violet which might have led to identifying the strains with *Br. melitensis*. The conclusion was that the strains, though somewhat atypical, were a divergent variety of *Br. abortus* Bang.

Three Bang's strains isolated from testicular tissue taken from steers suffering from joint affections showed the same characteristic. Many strains isolated from dairy herds in Java were normally sensitive to thionin. [*Van der Schaaf, A., and Rosa, Moh. Veterinary Institute, Buitenzorg, Java. Brucellosis and Onchocerciasis in Connection with Chronic Joint Disease of Cattle. Nederlansche Indische Bladen voor Diergeneeskunde, lii (Feb. 1940), pp. 1-20.*] C. H.

Salmonellosis in a Cow

Salmonella typhi-murium was isolated in a cow that was slaughtered in emergency. The cow had shown serious illness manifesting a bloody diarrhea. The postmortem appearances were those of septicemia. The antigenic formula and cultural characteristics classified the organism as type 4 (Tesdal). [*Kraneveld, F. C., and Erber, M. Batavia, Java. Salmonellosis in a Cow. (Title trans.) Nederlansche Indische Bladen voor Diergeneeskunde, lii (Dec. 1940), pp. 444-447.*]

There are 72,721 4-H clubs in the United States. The membership as of 1940 was 1,420,297.

The U. S. Bureau of Agricultural Economics reports that the prospects of the American farmer are better than for many years. Although the cost of production will be higher, prices and income also will increase.

It has been said and not contradicted that 40 per cent of our people have poor and inadequate diets. While the percentage must be higher in animals because the feed of animals lacks the variety of the human ration, a percentage in this connection would be but a wild guess.

Tuberculin Reactions in Cattle Infected with Mycobacterium Paratuberculosis (Johne's Disease)*

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THE ROLE played by Johne's disease in producing reactions in cattle tested with tuberculin has not been reported. A number of workers, however, have demonstrated that sensitization of cattle with a member of the acid-fast group of organisms may produce a nonspecific tuberculin reaction.[1-8] It is the purpose of this report to show on the basis of intradermal tests, gross pathology, and microscopic examination of acid-fast stained preparations of intestinal scrapings, that Johne's disease may cause a tuberculin sensitization which results in "no visible lesion" postmortem reports.

PROCEDURE

The tuberculin used in this experiment was prepared by the Biochemic Division, Bureau of Animal Industry. The intradermal johnin was prepared at this laboratory from flasks of synthetic media upon which *Mycobacterium paratuberculosis* had grown luxuriantly.‡ The method employed in preparing the johnin was the same as described by Dorset and Henley[9] for the preparation of intradermal tuberculin.

Herd 1, Table 1, was injected with 0.1 cc. of tuberculin intradermally in the right caudal fold, while a like amount of johnin was injected intradermally into the left caudal fold. Herd 2, Table 2, and Herd 3 received the tuberculin injection intradermally in the right caudal fold as did Herd No. 1; however, the johnin was injected into the left lip of the vulva in Herds 2 and 3. All readings were made after a lapse of 72 hours.

HISTORY AND RESULTS

At the time of the test, Herd 1 had 105 grade Holstein animals. Cows 14, 15 and 16, Table 1, were purchased in Ohio and added to the herd about a year prior to testing. Cow 12, Table 1, was purchased in Indiana and added at the same time. Cow 13, Table 1, was purchased at a dispersal sale held in the home county of this herd. The calf listed as No. 17, Table 1, was the daughter of cow No. 15. The remaining 99 cattle have a history of having been in this herd either throughout their lives or for a period of at least four years. Clinical Johne's disease was not present in this herd, nor was there a history which would have indicated its presence.

A tuberculin test was negative 14 months in advance of the present combination test. It is therefore interesting to note that all animals which reacted to both the johnin and tuberculin tests were either added to the herd following the previous tuberculin test or born into the herd following this test. Although the sizes of the two reactions were usually equal, the character of the reactions in two animals (Numbers 12 and 15, Herd 1) were different.

Of the 105 cattle tested in Herd 1, 6 reacted to both tuberculin and johnin, and 5 additional animals were positive to johnin only. (Table 1.) A postmortem examination failed to reveal tuberculous lesions in any of the six tuberculin reactors, while the intestinal tracts showed thickened areas as well as scattered small areas of capillary congestion along the crest of the folds. Acid-fast organisms indistinguishable from *M. paratuberculosis* were demonstrated in large numbers in cattle Nos. 12, 13, 14, 15 and 16, Table 1. No acid-fast organisms were observed in 12 slides examined from Calf 17, Table 1, although the gross path-

*From the Regional Laboratory for Animal Disease Research, Bureau of Animal Industry, U. S. Department of Agriculture.

†Tuberculosis Eradication Division, Bureau of Animal Industry, U. S. Department of Agriculture.

‡A description of this medium will appear in a later publication.

ology observed in the small intestines was the same as has been observed in Johne's disease cases in this age group.

Herd 2, Table 2, had 105 purebred Jersey cattle when they were tested with both johnin and tuberculin. This herd has had no replacements from outside for a period of 21 years with the exception of herd sires. Johne's disease has very probably been present in this herd for a period of at least 25 years. However, it was first diagnosed clinically and confirmed by laboratory findings in 1934 by Dr. C. A. Cary. The practice in this herd since 1934 has been to sell for slaughter all animals which manifested clinical evidence of the infection. In addition the herd record indicates that it has been necessary to slaughter from 2 to 6 cows each year as a result of persistent scouring and gradual emaciation.

When this herd was tested with tuberculin in February, 1939, 2 reactors were removed. Skin lesions only were observed in both cases. Of the 105 cattle tested with both johnin and tuberculin in June, 1940, 3 were found to react to both tests and 10 additional animals to johnin only. The reacting cows were examined for evidence of skin lesions when the tests were read, but no nodules could be found in the skin. No skin lesions or visible lesions of tuberculosis were observed in the 3 tuberculin reactors at the autopsy. However, the gross pathology present in the intestinal tract, and the presence of acid-fast organisms indistinguishable from *M. paratuberculosis* found in acid-fast stained intestinal scrapings, would seem to confirm the presence of Johne's disease in those animals.

Herd 3 is an assembled grade herd composed of 137 cattle which has had no history that would suggest the presence of Johne's disease. This herd had been tested with tuberculin in February, 1939. One cow gave a positive reaction but failed to show visible lesions on postmortem examination. When a year later both tuberculin and johnin were employed the cattle failed to react to either test material.

DISCUSSION

Unfortunately acid-fast organisms as well as other families of bacteria have a group antigen which causes a nonspecific sensitization. This has been demonstrated in the use of avian tuberculin for the diagnosis of Johne's disease, and the employment of human tuberculin in the diagnosis of bovine tuberculosis. The quantitative evaluation of the amount of specific and group sensitivity is of considerable academic value, but the nonspecific group reaction is of great practical value in the tuberculosis eradication problem. As the incidence of tuberculosis in cattle has decreased in the United States, these non-

TABLE I—Results of Field and Laboratory Findings in Females in Herd No. 1 (Holsteins)*

Cow No.	Age	Reactors to Test with—		Postmortem Findings	
		Johnin	Tuberculin	Johne's Lesions	Acid-fast Organisms in Intestinal Scrapings
12	6 yr.	X^4	P^3	Positive	Positive
13	6 yr.	X^3	X^2	Positive	Positive
14	6 yr.	X^3	X^3	Positive	Positive
15	6 yr.	X^2	P^2	Positive	Positive
16	6 yr.	X^5	X^2	Positive	Positive
17	7 mo.	X^2	X^3	Positive	Negative
18	6 yr.	X^4	—	———	———
19	5 mo.	X^2	—	———	———
20	6 mo.	X^4	—	———	———
2	7 mo.	X^2	—	———	———
22	5 mo.	P^3	—	———	———

*94 animals were negative to both tests.

X—A diffuse swelling and the number to its right equals the number of times the skin was thickened.

P—A pea sized reaction (3/16 inch) and the number to its right equals the multiple used in describing the amount of reaction.

TABLE II—Results of Field and Laboratory Findings in Females in Herd No. 2 (Jerseys)*

Cow No.	Age	Reactors to Test with—		Postmortem Findings	
		Johnin	Tuberculin	Johne's Lesions	Acid-fast Organisms in Intestinal Scrapings
37	5 yr.	X[2]	X[2]	Positive	Positive
38	4 yr.	P[4]	P[3]	Positive	Positive
39	5 yr.	X[2]	X[2]	Positive	Positive
40	6 yr.	X[5]	——	——	——
41	13 yr.	X[2]	——	——	——
42	12 yr.	X[2]	——	——	——
43	12 yr.	X[2]	——	——	——
44	11 yr.	X[3]	——	——	——
45	9 yr.	X[3]	——	——	——
46	6 yr.	X[2]	——	——	——
47	4 yr.	X[2]	——	——	——
48	6 yr.	X[3]	——	——	——
49	4 yr.	X[3]	——	——	——

*92 animals were negative to both tests.

X—A diffuse swelling and the number to its right equals the number of times the skin was thickened.

P—A pea sized reaction (3/16 inch) and the number to its right equals the multiple used in describing the amount of reaction.

specific types of reaction have become more noticeable. The problem of recognizing all the possible causes of no-visible-lesion cases and the percentage due to each causative agent must be solved before a correct evaluation of the undesirable economic effect of their slaughter can be ascertained.

It is generally believed that a part of the no-lesion type of reactors is due to the bovine tubercle bacilli, a somewhat smaller number to sensitization with the human tubercle bacilli, some as the result of infection with the avian tubercle bacilli, and probably a small number as the result of having been sensitized with some other member of the acid-fast family of organisms. Both the rather high percentage of herd and animal infection with Johne's disease that has confronted the authors* and the ever increasing number of herd infections brought to the attention of the Tuberculosis Eradication Division of the Bureau of Animal Industry would seem to indicate that this infection is also an important factor.

*Reactors have been found in 17 out of 20 herds tested with johnin. Of the 2,153 animals tested 304 reacted. Since many of these herds were tested because they had histories indicating infection with Johne's disease it is not believed that these results give a basis for an accurate estimate of the incidence of Johne's disease in this area.

SUMMARY

1. Three herds consisting of 347 cattle were tested with both johnin and tuberculin.

2. Of these 24 reacted to the johnin test.

3. Nine of the 2 johnin reactors reacted to the tuberculin test also. None of the 313 johnin negative cattle reacted to the tuberculin test.

4. No lesions of tuberculosis were found on autopsy in any of the 9 animals reacting to both tests. All 9 had lesions considered typical of Johne's disease, and acid-fast organisms indistinguishable from *M. paratuberculosis* were found in stained smears from the intestinal mucosa of 8 animals of this group.

[1]Traum, J.: Case reports of lymphangitis in cattle caused by an acid-alcoholic fast organism. J.A.V.M.A., lxix (1916), pp. 254-257.

[2]Hastings, E. G., Beach, B. A., and Thompson, I.: The sensitization of cattle to tuberculin by other than tubercle bacilli. Amer. Rev. Tuber., xxii (1930) 2.

[3]Elder, C. and Lee, A. M.: Injection of cattle with B. tuberculosis (avian) and results of subsequent tuberculin tests. J.A.V.M.A., lxiv (1924) (4), pp. 440-450.

[4]Crawford, A. B.: Studies in so-called "skin-lesion" tuberculosis. J.A.V.M.A., lxiii (1928), (2), pp. 216-222.

(*Continued on next page*)

Brucellosis in Horses and Goats*

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BRUCELLA infection in horses and goats occupies an important place in veterinary literature. Although the disease in both genera has been recognized for some time, interest in its importance in relation to Brucella infection in man and other animals is being revived. In the horse fistulous withers, poll evil and many other suppurative conditions are caused by *Brucella abortus*. There is evidence that a higher percentage of horses on farms, in contact with Brucella infected cattle, suffer from brucellosis than do horses maintained in cities. In many areas where Bang's disease is being eliminated from cattle, the horses also are being tested for Brucella infection and a reactor to the agglutination test is looked upon with much suspicion. On numerous occasions the horse seems to have been a reservoir of infection for the dairy herd.

TRAFFIC IN GOATS NOT REGULATED

In recent years, interest in the dairy goat in New York has increased. Many small dairies are now distributed throughout the state and large quantities of goat's milk are being sold. To supply the demand for the milk and to improve the breeding stock, goats have been purchased in distant states and shipped to New York. This interstate traffic in goats, unhampered by health regulations, induced us to look for Brucella infection in this species. Since most of the goats' milk in New York is consumed in the raw state, not a few of the consumers demanded that the goats be tested for Brucella infection. Fortunately we received a large number of these blood samples and had the opportunity to test them for Brucella agglutinins and to examine some of the goats that reacted.

MANY HORSES EXAMINED

Fifteen stables of horses containing from 41 to 120 animals each were tested in New York City. The percentage showing some reaction ranged from 69.69 per cent in barn No. 6 to a low of 16.87 per cent in barn No. 13. Of 1,169 animals tested in the city, 60.13 per cent were negative at a dilution of 1:25 and only 111 or 9.49 per cent were positive in a dilution of 1:50 or higher. Five horses reacted in a dilution of 1:200 and only 2 horses reacted at 1:400, the highest noted.

In 1933, a new system of numbering the New York City horses was instituted so that the year in which the horse was purchased could be easily told. By checking the number of each horse we were able to determine how many horses were purchased before 1933 and the exact number purchased and still in service in each of the following years. In this manner we determined that of the 1,169 horses now in service, 708 or 60.55 per cent were purchased prior to 1933 and 461 or 39.45 per cent were purchased between the years 1933-37. It was found that 42.66 per cent of the horses which had been in the city for the longer time showed some reaction, while only 35.58 per cent of the horses

*From the New York State Veterinary College at Cornell University; presented before the Section on Research at the 77th annual meeting of the AVMA, Washington, D. C., August 26-30, 1940.

(*Continued from preceding page*)

[5]Crawford, A. B.: Tuberculin reactions in cattle showing no visible tuberculous lesions on postmortem. J.A.V.M.A., lxxxix (Nov. 1936), pp. 562-583.

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[8]Gordon, Ruth E., and Hagan, W. A.: A study of some acid-fast Antinomycetes from soil with special reference to pathogenicity for animals. J. Infect. Dis., lix (1936), p. 200.

[9]Dorset, M. and Henley, R. R.: A synthetic medium for B. tuberculosis with a description of the method of producing tuberculin. Biochemic Division, Bureau of Animal Industry, Nov. 7, 1934.

which had been in the city for five years or less reacted. The horses which reacted at the highest titer, 1:400, were both in the group of horses which had been in the city for several years.

There were more horses negative at 1:25 in the group purchased after 1933 than in those purchased before 1933. No horses in this group, which had been in the city for a relatively short time (1 to 5 years) reacted in a dilution higher than 1:200 and only 2 horses were positive at this titer.

Horses with 1, 2, 3, 4 or 5 years in New York City had fewer agglutinins in each case than did horses there for more than 5 years. Of the 461 horses purchased in the last 5 years, 64.42 per cent were completely negative. Among the 708 horses purchased before 1933, 57.34 per cent were negative in all dilutions, which is 7.08 per cent less than the average of negative horses purchased after 1933.

Random blood samples were gathered from horses on 97 farms in many different rural dairy sections of the state. No information was available as to how long the horses had been in New York State or how intimate their contact with cattle had been. In a few cases it was indicated that cattle on the farms were infected with or were free from brucellosis. Some of the horses maintained on these farms suffered from fistulous withers. Two hundred and seventy serum samples were tested for Brucella agglutinins. Not quite half of the horses were negative in all dilutions and very few high titers were obtained. Only 9 reacted in dilutions higher than 1:200, and the highest was complete agglutination at 1:12,800. This high-reacting horse was stabled on a certified farm where difficulty had been experienced with new reactors among the cattle. On farms where brucellosis was known to exist among the cattle the horses reacted at higher titers than did those on farms where the disease did not exist. No horse on farms which had cattle free from brucellosis reacted in a dilution higher than 1:25. On the farms with Brucella infected cattle 7 horses reacted in dilutions of 1:100 or higher. Of the 36 horses on farms with infected cattle 15 or 41.7 per cent were negative in all dilutions, while on the clean farms 12 or 85.7 per cent were completely negative.

We were permitted to draw blood samples from all patients in the surgical clinic of the New York State Veterinary College as they entered and to make rechecks on the initial blood test as frequently as it was thought desirable. A total of 302 horses were tested of which 112 or 37 per cent suffered from either fistulous withers or poll evil. The remaining 190 horses or 63 per cent of all those tested were under treatment for other diseases. Of the 302 horses tested 118 or 39.07 per cent were completely negative. One hundred and eighty-four showed reactions at titers ranging from 1:25 to 1:51,200. Among the horses suffering from fistulous withers and poll evil 20 per cent were negative in a dilution of 1:25 and 80 per cent showed some reaction to the agglutination test for Brucella. In the group of clinical cases with other diseases 50 per cent were negative in a dilution of 1:25 and 50 per cent were carrying some Brucella agglutinins.

ORGANISM ISOLATED

In attempts to isolate the organism, cultures were made of 18 cases of poll evil and fistulous withers. We were able to isolate the organism from 11 of the 18 horses either by direct culture or by guinea pig inoculation. Of the 18 horses examined, 14 had unopened lesions from which the isolations were made. *Br. abortus* was not recovered from any lesion which had been open more than three days. Of the three unruptured lesions that did not yield the organism, the first occurred in a horse suffering from poll evil. The blood serum of this horse was negative in all dilutions. The second occurred in a case that was operated upon by a practitioner. The sample was obtained at the time of the operation. The third case was not a true fistula of the withers; it was classified by the clinicians as a "seroma." Although this animal, a mule, reacted at a dilution of 1:51,200 and the lesion had never been opened, we were unsuccessful in obtaining

Brucella both by culture or guinea pig inoculation.

Brucella not infrequently invade the stifle and fetlock joints of horses. The lameness is severe and often swelling is produced. Cultures of fluid from the inflamed joint will yield the organism in pure culture and the agglutination titer is usually high (1:1,600). Fecal samples taken from horses in the clinic that were apparently normal and from others that were under treatment for a variety of diseases did not yield Brucella in any instance. Many of these horses reacted at titers ranging from 1:50 to 1:3,200.

A negative zone in the lower dilutions of equine serum was noted. In the higher dilution of serum the zone disappeared and complete agglutination occurred. This negative prozone was very confusing on several occasions as it extended through four tubes or a dilution of 1:200. If only four dilutions are used in testing equine serum and a negative prozone is present at a dilution of 1:200, a wrong interpretation may be given the sample.

Br. abortus injected subcutaneously into horses that are negative will produce a positive reaction in dilutions of 1:400 to 1:1,600 in 7 to 9 days. The point of injection will swell and a hot abscess will form in 3 to 4 days. The abscess will usually rupture in 9 to 12 days and discharge Brucella in large numbers. Drainage from the abscess will continue 3 to 5 weeks with *Br. abortus* discharged in the pus.

RESULTS IN GOATS

Random blood samples were obtained from 419 goats and tested for their Brucella agglutinin content. Three hundred and ninety-six or 94.51 per cent were completely negative in all dilutions. Twenty had a titer up to and including a dilution of 1:50, and only 3 reacted at a higher titer. No goat reacted as high as 1:100. Two Saanen goats, 3 and 9 years old, that reacted at titers of 1:25 and 1:50 respectively, were submitted for further examination along with one 6-year-old Alpine goat showing reaction at 1:50. Herd histories did not reveal any trouble with abortion or sterility. Milk samples were collected daily from each goat and examined for Brucella by injecting the top and sediment of the milk into guinea pigs. Agar plates were also used in an effort to isolate Brucella. In no sample of milk did we obtain any Brucella organisms. All of the plates were completely negative and no guinea pigs became infected from the inoculum. Likewise no Brucella agglutinins were detected in any sample of milk. A total of 15 milk samples from each goat was examined.

Autopsies were performed on the two Saanen goats and cultures and inoculations were made from the genital tract and some of the lymph nodes. The supramammary, prefemoral, mediastinal and retropharyngeal lymph nodes, as well as both ovaries and the uterus, failed to yield any Brucella organisms.

Area Tuberculosis Control in Human Medicine

Meeker county, Minn., goes on record as the first area in the world where systematic tuberculosis eradication in man will be attempted on the plan which has proved so successful in controlling tuberculosis in domestic animals.

Prof. J. A. Myers, author of "Man's Greatest Victory Over Tuberculosis," is one of the sponsors of a movement to tackle tuberculosis of the human being in much the same fashion as the veterinary service tackled the disease in the bovine species. Quoting from a press clipping sent by colleagues at University Farm:

> Taking their cue from the accomplishments of the veterinarians in the eradication of cattle tuberculosis, they [the physicians] will attempt to reach every man, woman and child in Litchfield first, then the rest of Meeker county and, finally, if the experiment is a success, in the other counties of the state.

The meeting at which this project was launched was held under the auspices of the Minnesota State Medical Association.

The Importance of Vitamin-Mineral Supplements in Equine Nutrition

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IN STUDYING the nutritional requirements of domestic animals, careful consideration should be given to the source of the foods that constitute the rations being fed. It is not intended, within the scope of this review, to cover other than the vitamin and mineral requirements of the horse and to refer to the energy requirements (carbohydrates) only as these are affected by deficiencies of vitamins and minerals.

Domestic animals, except the suckling young, obtain practically all of their normal supply of vitamins and minerals from the same source they obtain other food elements, namely, plant life. Some of the essential minerals may be obtained in other ways, such as from water or by direct consumption of mineral compounds.

The rapid advances made within the past few years in solving the problems of vitamin and mineral metabolism in both plants and animals have, however, brought to our knowledge the extreme variations which may exist in the nutritive properties of plants with respect to their vitamin and mineral contents. The mineral contents of plants are subject to wide variations, depending upon such factors as the type of soil, kind and amount of fertilizer used, rainfall, irrigation, cultivation, rotation of crops, and possibly other cultural factors indigenous to specific localities. Since the ultimate solution to the various problems of animal nutrition goes back directly to the soil, and since many soils are notoriously deficient in many of the mineral elements, the problem of abundant animal nutrition will still be with us for many years to come.

VITAMIN AND MINERAL CONTENT OF PLANTS DEPENDENT UPON GOOD GROWTH

It can be considered axiomatic that the vitamin content of a poorly nourished plant is low. This has been demonstrated conclusively by various workers in the field of plant culture, biochemistry and animal nutrition. Plants grown in soil deficient in minerals or having an improper mineral balance, *i.e.*, high in some minerals and abnormally low in others, lack a normal content of carotenes, precursors of vitamin A, which is found most abundantly in plants. Likewise, poor mineral nutrition directly affects the nitrogen metabolism of the plant, resulting in stunted, coarse growth and loss of vitamin B_1 and other components of the B complex. Such plants—and they may include corn, oats, rye, wheat, barley, legumes and the various leafy grasses which make up the bulk of food for domestic animals, particularly the horse—are deficient not only in minerals and vitamins, but also in proteins, carbohydrates and other nutritive elements. This deficiency in general nutritive value further complicates the effect of lack of vitamins and minerals so that the animal, although apparently well fed, is actually being starved.

ECONOMY FACTOR FOREMOST IN ANIMAL-FEED PRODUCTION

It is vital to the raisers of domestic animals, horses in particular, to realize that the production of animal feeds is based essentially on economy. This is particularly true of commercial feeds, the price for which becomes an important factor to the stock raiser.

In the case of the horse, however, a different problem presents itself. Not being normally a food-producing animal, the horse is longer lived and is used more for its capacity to work, with the result that nutritional disturbances due to deficiencies of vitamins and minerals in the feed become more apparent.

NUTRITION OF HORSES

The principles of the nutrition of horses in general, as pointed out by Krantz and

Speelman,[1] are fundamentally the same as those of other domestic livestock. For growth, reproduction and maintenance the horse requires protein, carbohydrates, fats, minerals and vitamins, just as these essentials are required for similar vital processes in food-producing animals. The relative importance of the various nutrients and the quantities required by the horse, however, differ from those of other animals.

In general, the nutritive requirements of horses, like other domestic animals, are subject to considerable variation, depending upon age, breed, degree of activity, climatic condition, quality and amount of feed, type of handling, management, etc., and possibly other factors which may pertain to the individuality of the animal. In the past any discussion of the nutritive requirements of horses was considered chiefly from the standpoint of adequacy of rations, feed economies and feeding practices.

The nutritive qualities of horse feeds suffer from the same degree of variation as do the nutritive qualities of crops raised for human consumption. Heavy croppings and mineral depletion of the soil have generally affected these feeds. Lack of pasture and grazing lands have made it necessary to depend to a great extent on compounded feeds instead of natural crops. Since economy is one of the main factors in horse feeding, some prepared foods are notoriously deficient, both in quality and quantity, in vitamins and minerals.

Although most of the available information as to the nutrition of horses deals chiefly with protein and energy needs, there are adequate published data to show that vitamin and mineral supplementation is required in their daily diet.

RACING HORSES: A PROBLEM IN NUTRITION

While the above data apply to the nutrition of horses in general, it must be recognized that the principles of adequate vitamin and mineral nutrition have special significance in the case of race horses, both in training and in reproduction.

It is generally accepted that variations in activity and living conditions necessarily cause a wide variation in the systemic requirements for these substances. For instance, animals working at top speed, whether it be physical exertion or the production of animal-food products, are consuming through metabolism mineral, vitamin and endocrine substances at the expense of the nervous and reproductive systems. On the other hand, animals under extreme nervous strain, such as horses in racing or animals used only for the production of offspring, require quantities of these factors in excess of normal.

As a rule, the Thoroughbred in training is subject to forced growth, since its economic status depends on its ability to successfully contest in races as a 2-year-old. Since the Thoroughbred is considered to be a year old on the first of January following the date of foaling, and since most horses are foaled in the spring or early summer, a 2-year-old may actually be only 18 months old on the second new year following its birth. This forced growth, together with the severe training which racing horses undergo, causes severe strain and tension, not only on the vegetative system, but on the endocrine and nervous systems as well.

Under these conditions of severe nervous and glandular reaction, mere maintenance levels of vitamins and minerals in the diet are insufficient to keep the horse in proper condition and usually result in lowered vitality and inability to withstand the routine of training and competitive racing. Thus, many a promising race horse has been relegated to a period of convalescence for no reason other than nutritional deficiencies, the basis of which may well have been an inadequate supply of either vitamins or essential minerals, or both.

Vitamin and mineral metabolism in animals are so closely interrelated that it is often difficult to describe the functions of a vitamin without simultaneously taking into account the related functions of one or more mineral elements. The nutritional interrelationship of vitamin D with calcium and phosphorus is a classical example. The functions of the vitamins themselves, however, and the symptoms resulting from a

[1]Krantz, E. B., and Speelman, S. R.: Nutrition of horses and mules. USDA Year Book (1939), p. 763.

lack of these organic substances have been extensively explored in animal and human nutrition and have been described *in extenso*.

VITAMIN REQUIREMENTS OF THE HORSE

While the rôle played by vitamins in the nutrition of the horse has not been as extensively explored as that of other animals or man, it is well known that horses show the same type of symptoms resulting from lack of certain vitamins as do other smaller animals whose nutrition has been studied more thoroughly. With respect to the actual vitamin requirements of the horse, we must rely for the present on the analogy that these requirements are generally similar to those of other animals and, with certain exceptions, not dissimilar to the vitamin requirements of man.

Based on known research, we can, therefore, outline the various functions of the vitamins and their deficiency symptoms as they affect equine nutrition.

Vitamin A.—This vitamin, which is usually obtained by the animal direct from plant food in the form of its precursors alpha, beta and gamma carotenes, and possibly other plant pigments, is essential not only for growth of the young and maintenance of the matured animal, but also for reproduction, lactation and other vital functions.

Vitamin A is of particular importance in the horse in its relation to infections of the respiratory system, eyesight, reproduction, the nervous system and hoof development. Klemola[2] described how a deficiency of vitamin A caused marked changes in the hoofs of horses in the army of Finland, resulting in cracks, furrows and abnormal growth. That this was definitely a vitamin A deficiency was confirmed by Scheunert and Schieblich[2a] and, furthermore, the condition was markedly alleviated by adding cod liver oil and other substances containing vitamin A to the basal ration. That such a condition can have serious consequences to race horses is obvious. The importance of vitamin A for growth of young animals has been thoroughly demonstrated. Its function of keeping the epithelium or surface tissues of the mucous membranes in a healthy condition to resist bacterial infections is also well established.

Xerophthalmia and night blindness resulting from a deficiency of vitamin A have been demonstrated experimentally in horses by Guilbert, Howell and Hart.[3] A deficiency of this vitamin also may result in degeneration of the nervous system which is characterized by a lack of coördination of the legs and impairment of vision. Lack of vitamin A also has been shown to cause sterility in both male and female animals. Howell, Hart and Ittner[4] recently reported joint involvement with lameness and characteristic rarefying lesions in the joint cartilage in horses on experimental diets deficient in vitamin A.

Another important factor in vitamin A deficiency in horses may be due to inability of the animal to convert carotene and other pro-vitamin A substances occurring in plants into vitamin A. Since this transformation takes place in the digestive system of the animal—chiefly in the liver—from which vitamin A is absorbed, disturbances and abnormalities in this system may reduce the capacity of the animal to make this conversion and thereby result in a deficiency of vitamin A *per se*.

Both carotene and vitamin A are subject to destruction by oxidation which may result in a loss of vitamin A value in many plants and various varieties of hay used for forage, and considerable loss may result in roughage or other forage when these are stored for long periods.

In determining experimentally the minimum requirements of this substance for the horse, *i.e.*, the amount just required to prevent night blindness, Guilbert, Howell and Hart[4] found the daily intake need to be 17 to 22 I. U. (in the form of cod liver oil) per kilogram (2.2 lb.) of body weight, and

[2]Klemola, V.: Keratoplastic reaction of hoof formation to some physiological factors. Biedermanns Zentr. B. Tierernahr., v (1933), p. 657.

[2a]Scheunert, A., and Schieblich, M.: Biedermanns Zentr. B. Tierernahr., vi (1934), p. 133.

[3]Guilbert, H. R., Howell, C. E., and Hart, G. H.: J. Nutri., xix (Jan. 1940), pp. 91-102.

[4]Howell, C. E., Hart, G. H., and Ittner, N. R.: Vitamin A deficiency in horses. Am. J. Vet. Res., ii (Jan. 1941), pp. 60-74.

33 to 50 I. U. when supplied in the form of carotene. Thus, about two to three times the amount of carotene equivalent of vitamin A is needed by comparison with actual vitamin A.

While racing horses, especially those in training, receive as a rule high grade forage, they are allowed little or no grazing. Unless their food is particularly rich in vitamin A or is supplemented with vitamin A, a deficiency of this factor may occur.

The maintenance requirement for horses, *i.e.*, the amount required to enable the animal to store up a supply, is stated by the above investigators to be about three times the minimum level of vitamin A and five times the minimum carotene level. These figures stress the marked decrease in relative efficiency of carotene with increased intake. For maintenance purposes the horse requires about 3,000 U.S.P. units per 100 lb. of body weight. Thus, a full-grown horse or a 3-year-old weighing 900 to 1,000 lb. may require as much as 30,000 units per day. Growing colts and mares may require slightly more in proportion to weight, while pregnant and lactating mares require from 25 to 50 per cent more.

Vitamin D.—Horses, like all other animals, frequently suffer from a lack of vitamin D. Rickets may occur solely as a result of a deficiency of this vitamin or as a result of a deficiency of vitamin D complicated by a deficiency of calcium or phosphorus or an improper balance of these minerals. The latter phase will be discussed more fully under the heading of mineral nutrition. It also has been demonstrated that vitamin D plays an important rôle in reproduction and in the health and viability of the animal offspring. This applies to horses equally as well as to other animals. The requirements for vitamin D are especially great during growth, when the bony structure is being developed. Today vitamin D is considered essential even for the mature animal, although in lesser amounts in proportion to weight.

The distribution of this vitamin in plants and other forage used for horses is limited to the amount of precursors, ergosterol and other sterols, which are activatable to one or more forms of vitamin D by the ultraviolet rays of the sun. A certain but limited amount may be produced in the skin of the animal by direct exposure of the animal to sunlight. The limitations are, of course, dependent on the time of exposure, locality, amount of direct sunlight and season of the year.

Among the common feeds for horses, hay and dry roughage that have been sun-cured are the only important sources of vitamin D and these are also subject to various limitations. Due to the limited amounts of vitamin D present in stock feeds, the supplementation of animal feeds has become common practice.

Horses in training have a special need for vitamin D in addition to their ordinary needs for skeletal growth and maintenance. Due to their rapid growth and need for strong bones, foals and growing horses must have supplements of vitamin D, possibly in greater amounts than any other animal. That vitamin D may also be required by horses in training as a stabilizing factor for their nervous systems has been suggested by some veterinarians. In this respect the influence of this factor may be indirect; however, it is apparently beneficial.

Horses subject to the rigors of training and racing require from 700 to 1,000 U.S.P. units of vitamin D per 100 lb. of body weight per day. During pregnancy and lactation, there is even a greater need for vitamin D in order to enable the mare to assimilate the large amounts of calcium and phosphorus needed for the production of milk and the growth of her foal.

Vitamin B Complex.—The importance of the vitamins of the B group in animal nutrition has been so thoroughly established that supplementation of them in animal feeding for breeding and other purposes has become routine. There is no reason to believe that horses differ from other animals in respect to their requirements of vitamins B_1, G (riboflavin), nicotinic acid and the various other factors which make up the B complex. Lack of vitamin B_1 may result in poor growth and a tendency towards leg weakness. Addition

of B_1 to the diet markedly improves the appetite and food utilization. Lack of it disposes the animal, particularly race horses, to various disturbances of the nervous system. Horses in training, working under a highly nervous strain, require larger amounts of this substance as supplements to their normal rations.

Partial deficiencies of vitamin B_1 in mammals are undoubtedly more common than is generally supposed, since it is known that this substance is not retained for any appreciable time. Vitamin B_1 is definitely concerned with carbohydrate metabolism and, as pointed out by Cowgill,[5] the requirement of an animal for this vitamin is dependent on body weight and caloric intake, other than fat, regardless of the species.

Next to anorexia the most common symptom of vitamin B_1 deficiency in the animal is a multiple peripheral neuritis. In the horse inanition with marked tachycardia follows the loss of appetite. If not corrected, the condition is succeeded by muscular atrophy.[6]

Vitamin B_1, though widely distributed in some stock feeds, especially the whole cereal grains, is not present to any great extent in cured hay or dry forage. Reinforcing commercial feeds with extracts obtained from yeast and rice-polish extracts or with thiamin hydrochloride has been instituted by some feed manufacturers, but due to the present high price of the vitamin, this practice will probably not become general for some time to come.

Vitamin G, also known as B_2, is chemically designated as riboflavin and has been isolated and synthesized in the laboratory. The synthetic product is now being manufactured on a fairly large scale.

While some animals, such as the ruminants, can synthesize riboflavin in their stomachs, as described by McElroy and Goss,[7] this is not thought to be true of the horse. The exact requirements of the horse for the vitamins of the B complex are not established, but it is known that horses do require these vitamins possibly to as great an extent as man. Those vitamins commonly included in the B complex group required by the horse for growth, maintenance and reproduction include riboflavin, nicotinic acid, pantothenic acid, vitamin B_6 and probably others.

Riboflavin acts as an oxidative enzyme in the animal body and although it is known to be required for growth by all animals, it is also thought to be essential in the metabolism of certain carbohydrates. Although its precise function, if any, in the horse has not been determined, its definitely known need in cellular metabolism in the human, in the fowl, in dogs and other animals makes it appear evident to all veterinarians that the horse, whose caloric intake is due in large measure to carbohydrates, may require this vitamin in fairly large amounts.

Riboflavin, like vitamin B_1, is widely distributed in whole grains and the greens of certain plants, such as turnip and beet tops, kale and mustard greens. While the vitamin is present in varying amounts in vegetables, grasses, hays and other green forage, it is particularly sensitive to light and alkalies, and as a result, much of it may be lost in the process of curing hay and forage for animal use.

Like vitamin B_1, the cost of the synthetic vitamin itself makes its general incorporation into commercial feeds a costly procedure.

Very little information is available regarding the requirements of the horse for the other vitamins of the B complex. There is no reason to believe, however, that horses differ from other animals in respect to their requirements for nicotinic acid and the various factors which make up the B complex. Recent observations by workers in the field of animal nutrition[6] indicate that horses may be susceptible to a deficiency of these vitamins as manifested by digestive disturbances.

Nicotinic acid has been shown by various

[5]Cowgill, G. R.: The Vitamin B Requirement of Man. (Yale Univ. Press, 1934.)

[6]Carlstrom, B., and Hjarne, A.: Digestive disturbances of military horses produced by vitamin B deficiency. Biedermanns Zentr. B. Tierernahr., xi (1939), pp. 121-129.

[7]McElroy, L. W., and Goss, H.: A quantitative study of vitamins in the rumen content of sheep and cows fed vitamin-low diets. J. Nutri., xxi (Apr. 1941), pp. 405-408.

workers to be significant in the nutrition of man, dogs and various species of domestic animals. Loss of appetite, anemia, dermatitis and various forms of digestive disturbances have been noted in swine, dogs and other animals due to a lack of nicotinic acid. Since grains and grasses are poor sources of nicotinic acid, it is not unlikely that horses may be prone to nicotinic acid deficiencies.

Vitamin B_6, now known chemically as pyridoxin, is chemically related to nicotinic acid, and although nothing is as yet known regarding its need in the horse, it is known to be of great importance in man, rats, dogs and other animals. The marked effect of vitamin B_6 on muscle and nerve control in humans suggests that this vitamin may be required by horses, especially the race horse which undergoes terrific muscular and nervous activity. This vitamin is also thought to be of importance in the production of the respiratory enzyme and for the utilization of unsaturated fatty acids.

Supplementation of the feed of racing horses with nicotinic acid, vitamin B_6, pantothenic acid and other factors of the B complex, besides riboflavin and vitamin B_1, is considered desirable for their optimum well being.

Vitamin C.—The rôle of vitamin C in the diet of the horse is not well understood. Although some investigators believe that the horse may synthesize its own vitamin C or some related antiscorbutic factor, it is generally considered that Equidae do not normally require this vitamin in the diet; however, further research data are needed to confirm this point.

Vitamin E.—The requirements of the horse for vitamin E are not established, although some investigators believe this vitamin is of importance in regulating fertility in the mare. It is known, for instance, that mares become more fertile after being on green pasture for several weeks. That this phenomenon may be due to the presence of vitamin E in the grass is possible, but is, however, subject to further investigation.

Vitamin E, which has been isolated and chemically synthesized, and designated as α-tocopherol, may be of additional importance in the diet of the horse in connection with muscular activity. Certain types of muscular dystrophy in man and animals have been treated successfully with synthetically prepared α-tocopherol or fairly large doses of wheat germ oil, the most abundant natural source of vitamin E.

While vitamin E is particularly abundant in the wheat germ and other cereal grains and seeds and may be widely distributed in stock feeds that have not been subjected to artificial refinement, it is subject to deterioration by oxidation and rancidity and may frequently be absent in commercial feeds. Many cases of sterility among farm animals have been traced to feeds devoid of vitamin E.

In view of the apparent need of vitamin E for good reproduction in brood mares and for the prevention of muscular paralysis in horses in training, it appears to be highly desirable that the diets of all race horses, both in training and in breeding, be supplemented with substantial amounts of vitamin E.

Other Vitamins.—It is quite probable that other vitamins, both known and unknown, may play significant rôles in equine metabolism. While vitamin K may be required by the horse in the prevention of certain types of hemorrhagic conditions, data are not yet available to substantiate this.

MINERAL REQUIREMENTS OF THE HORSE

Raisers of livestock, horse owners and veterinarians have known for many years, more or less empirically, that certain minerals are essential for the growth, health and reproduction of sound stock. It is only within recent years, however, that research has revealed the causes and methods of prevention of certain serious diseases which are due to mineral deficiencies. As a result of these investigations, considerable popular interest has been aroused in the subject of mineral nutrition in farm and domestic animals. Mineral deficiencies in animals extend not only to the more common min-

eral elements, such as sodium, potassium, calcium, phosphorus and iron, but also to the so-called trace mineral elements—manganese, copper, iodine, magnesium and zinc—which are considered to be essential for well-balanced nutrition.

Calcium and Phosphorus.—Calcium and phosphorus are considered to be the most essential mineral elements in the body of the horse as well as of most other domestic animals. These two elements alone constitute about 90 per cent of the mineral matter in the skeletal structure of the horse. The need for calcium and phosphorus in the horse is, of course, greatest during the early or bone building stages, particularly throughout the first years of life. As the animal approaches maturity, which is usually in the last of the third year of life, the need for these elements diminishes so that at full maturity the requirements are chiefly those for maintenance or regulation of normal functions.

Brood mares need considerably more calcium and phosphorus for reproductive functions and for nursing of the foal. There is some experimental evidence to show, however, that even mature horses of all ages are affected adversely in various ways when the intake of these minerals is inadequate in amount or poorly utilized. In this respect the horse reacts like man and other animals, in that the absorption and utilization of calcium and phosphorus are controlled by vitamin D and possibly by other vitamins.

Mineral deficiencies may result in various disturbances in growth, digestion and nerve metabolism, particularly in race horses and other breeds of highly bred pleasure horses. Race horses are usually subject to forced growth with the resulting consequences often due to lack of essential minerals.

The calcium-phosphorus ratio is of extreme importance, since the horse appears to be unusually susceptible to the effect of an excess of phosphorus over calcium in the feed. A ration too high in phosphorus causes a disturbance of the mineral metabolism which results in softening of the skeletal structure and a condition known as osteomalacia deformans or osteodystrophia fibrosa. To prevent this condition the ratio of calcium to phosphorus in the diet must be at least 1:1 and not over 1:1.2. A Ca:P ratio 1.0:0.8 would be more satisfactory.

Under domestic conditions the feed of horses is such that an excess of phosphorus may easily be given unless care is exercised. There is a great excess of phosphorus over calcium in oats and bran, the ratios being 1:3.6 and 1:1.1, respectively. In hay, on the other hand, calcium exceeds phosphorus. Thus, a liberal diet of hay is necessary for horses fed a grain mixture of oats and bran. The ratios of these mineral elements also vary in different types of hay; therefore, the type of hay fed must be taken into consideration.

The actual requirements of calcium and phosphorus in horses are not known, but based on growth data obtained in tests at the University of Missouri and Morrison's feeding standards, it is estimated that a horse weighing between 400 and 1,600 lb. requires a daily allowance of 13.5 Gm. of calcium (9.0 for growth and 4.5 for maintenance) and 13.6 Gm. of phosphorus (4.7 for growth and 8.9 for maintenance).

An excellent review and discussion on calcium and phosphorus in equine metabolism was published by Schmidt[8] in this journal. Schmidt states in conclusion that it is advisable to supply the elements, calcium and phosphorus, not only in amounts well above the minimum requirements, but also in the proper proportion to offset imbalance of these elements in the feeds.

Other Essential Minerals.—Besides calcium and phosphorus, which are the most important minerals in the growth of the bone structure, the horse requires other mineral elements for complete and satisfactory nutrition. These are sodium, chlorine, iodine, iron, potassium, sulfur, copper, zinc, manganese, magnesium and, possibly, cobalt.

Sodium and chlorine are required for

[8]Schmidt, H. Calcium and phosphorus deficiencies in cattle and horses. J.A.V.M.A., xcvi (Apr. 1940), pp. 441-456.

growth and maintenance by horses of all ages. While these elements in the form of sodium chloride are not abundant in animal feeds, it is common practice to supply them to horses in the form of salt lick blocks or cakes. It is an excellent example of a mineral supplement to the daily feed ration.

Potassium and sulfur are essential and are obtained in ample amounts in the average feeds. In certain localities, however, potassium may be lacking in the soil with the result that grains and forage grown in that soil may be deficient in potassium. Sulfur is present in all proteins and is particularly high in proteins of legumes, grains and seeds which make up the bulk of horse feeds.

Iron and copper are essential in the formation of blood. While iron is directly utilized in the formation of hemoglobin, copper is needed in traces as a catalyst in this formation and is thought to stimulate the assimilation of iron from the food. Deficiency of iron and possibly copper may result in various forms of anemia in the horse. In race horses, anemia caused by deficiencies of these elements can become a serious economic factor.

Iodine is required in the formation of thyroxine in the thyroid gland, which controls the rate of metabolism of the body and rate of growth. Deficiency of iodine will result in a condition of goiter found to be common among farm animals in regions lacking iodine in the soil or drinking water. A supplementary supply of iodine in the diet of the horse is a practical necessity.

Magnesium, manganese and zinc are required only in trace amounts, but are, nevertheless, essential to the well being of the animal and in many cases even to life. While they may be present in the average horse feeds, they should be included in supplementation of the diet in balanced proportions for optimum health. In brood mares manganese is needed in lactation.

SUMMARY AND COMMENTS

Vitamins and minerals, in addition to proteins, carbohydrates and fats, are essential to the complete nutrition of the horse. Since plants constitute the main source of food for horses, it is of paramount importance that these plant foods, which may include grains, grasses, tubers and a variety of hay, contain the vitamins and minerals common to each plant in optimum amounts. Various factors tend, however, to affect the nutritive properties of plants used for horse feed. Most of these factors can be traced back to the soil, which is the source of nutrition for the plants, to variations in plant culture and to economy of production. Lack of pasture and grazing land and dependence upon compounded feeds artificially processed, which may be notoriously deficient in both vitamins and minerals, are to a great extent responsible for the failure to insure satisfactory nutrition.

Racing horses in particular, being subject to forced growth from birth and the rigors and nervous strain in training, require optimum amounts of vitamins and minerals, not only for growth and maintenance, but also for satisfactory reproduction, upon which part of the economic status of racing is based.

To satisfy this optimum need of vitamins and minerals and to overcome the apparent deficiencies in average horse feeds, some form of supplementation is not only good practice, but in many cases essential.

While a horse may show the symptoms of only a single avitaminosis, the rule rather than the exception indicates multiple deficiencies and the treatment should consist of supplementation with multiple vitamins and, where indicated, multiple minerals. Research in the field of nutrition is fascinating, for discoveries that seem to be of paramount importance today may be commonplace and in the discard tomorrow. The public is becoming more and more vitamin-conscious. Physicians recognize the importance of vitamin-mineral supplements to the diet of the average person.

Veterinarians must keep abreast of developments in the field of animal nutrition. The days when salt, bone meal and hardwood ashes constituted a sufficient mineral supplement to the diet of livestock have long since passed. Vitamin and mineral supplements combined in palatable form

that are easy and practical to administer are appearing on the market. The ease of administration and adaptability of this type of product are important advantages to the veterinarian, to the trainer of horses and to the livestock husbandman.

Farm Security Practice*

J. H. RYLAND, D.V.M.
Selma, Ala.

THE FSA represents one of those many efforts of the present administration to help a certain class of farmers who are unable to provide themselves with the necessities of life for self and family—the class that as a whole were a burden to landlords, merchants and relief agencies. The purpose is to establish these poor people on farms and teach them to become self-supporting.

In developing this program it was necessary that large numbers of work stock and foundation stock of cattle and hogs be supplied. This led to the need of veterinary service especially for acute or emergency cases. During 1938, numerous calls were answered, for which service there was no provision for remuneration. This led to a series of conferences with the county, district and state supervisors. From these conferences, we formulated a coöperative veterinary service agreement, as follows:

Memorandum of understanding for veterinary service in any county between the veterinarian and the clients of the Farm Security Administration.

Provision 1. That the Farm Security Administration agrees to lend to each of its clients in any county participating in this plan the sum of $2.50 to be used for veterinary service for the period of January 1, 1940, to December 31, 1940, inclusive.

Provision 2. Funds loaned, as provided in Provision 1, shall be pooled and placed in the hands of a trustee who shall pay for veterinary services monthly. A check, amounting to 1/12 of the total fund, shall be delivered to the veterinarian upon receipt of a statement from him on the prescribed form setting forth services rendered during the month.

Provision 3. All clients of the Farm Security Administration residing in any county shall be extended an opportunity to participate in this plan upon payment of the prescribed fees. Services rendered under this agreement shall be limited to any necessary service covered by these provisions. Any abuse of the privileges extended hereunder by any client shall be considered in judging that client for any further benefits from the Farm Security Administration. The county personnel of the Farm Security Administration shall do all possible to coöperate with the veterinarian in controlling such abuses as may develop during the duration of this agreement.

Provision 4. Livestock belonging to the participants in this agreement shall be entitled to all services rendered in annual bot control clinics held by the veterinarian, including dental work and minor surgery, where necessary, it being understood and agreed that said services shall be made available at a point reasonably accessible to the farms of said Farm Security Administration clients. In addition thereto, the client shall be entitled to and shall receive necessary emergency calls to animals covered under this agreement. Wherever possible, emergency calls shall come through the local Farm Security Administration office.

Provision 5. Service under this agreement shall be limited to horses, mules, cattle, and hogs.

Provision 6. Drugs for use in emergency cases and bot control clinics shall be furnished by the veterinarian. All biological products, and drugs for cases other than acute emergency cases and bot control shall be furnished by the client. It shall be left to the judgment of the veterinarian and county supervisor when and where biological products shall be used in event of infectious diseases, according to the rules and regulations of the livestock sanitary board.

Provision 7. This agreement does not include vaccinations for encephalomyelitis. It is hereby agreed and understood in event that it is judged advisable to vaccinate against en-

*Read before the annual meeting of the Southern Veterinary Medical Association, Birmingham, Ala., November 13-15, 1940.

cephalomyelitis that the client is to furnish an approved vaccine and pay the veterinarian 50c per dose for administration provided the animals are assembled as in clinical work.

Provision 8. The veterinarian shall not be held responsible for losses from death or impaired usefulness of any animal resulting from causes beyond the reach of ordinary professional services.

Provision 9. The veterinarian shall not be expected to provide hospital treatment for any animal covered in this agreement other than at the expense of the client or by direction of the veterinarian.

Provision 10. This agreement can be terminated for justifiable reasons by either party at any time provided fifteen days notice in writing is given the other party.

Provision 11. In all matters concerning this agreement, it is understood that the county supervisor shall act for and on behalf of the clients of the Farm Security Administration.

Provision 12. The trustee of this fund shall be bonded and payment for said bond made from this fund. In addition to this, such other administrative expenses as may be necessary shall be paid therefrom, not to exceed $5.00 for the twelve months.

This contract was the best that we could get, and was intended at that time to serve as a record on which to base future decisions. It was understood that this contract was to last for one year, and after tabulations were considered, further discussions would be held regarding the advisability of expanding or discontinuing the project. At the end of 1939 we held several conferences with the state authorities of the FSA, to which the state veterinarian was called. The authorities were of the opinion that it was impossible to procure any more money per family and it was decided that the practitioners in all counties would be offered this agreement and the project be given another trial in the state at large. The results of this trial are yet to be heard.

My records show that for the period including the first nine months of this year, we held our general clinics, treating 1,363 cases which necessitated driving 2,442 miles, and an expense for supplies of $152.80. We have answered 332 calls on which we drove 16,110 miles with expense of treating the cases $375.95.

Total mileage, 18,552 at 5c per mile, $927.60, plus expense for supplies of $528.75, total $1,455.35.

Had this service been charged for as in private practice, it would have amounted to $6,229.52.

We received from the FSA clients.	$2,359.49
Less expense of	1,455.35
A profit of	$ 904.14
Estimating private practice at	$6,229.52
Cash from FSA clients	2,359.49
Difference of	$3,870.13

The Cause of World War II

In discussing editorially the mental health of the people in wartime, *The Journal of the American Medical Association* says in effect that if a nation (including ours) believes that its culture is the only one really worth having, the consequence is serious. World War II is a trend toward greater internationalism, with both constructive and destructive forces operating. The destructive impulse arises from the belief that the old state of affairs is so bad that everything must be destroyed before anything better can take its place. Some folks even in our own country are now advocates of that philosophy. In short, the average person wants nothing more than to be left in peace and to accomplish that end he becomes the willing dupe of dictators to whom he is instinctively drawn. Quoting: "Where facts are few, rumors are many. Both the demand for leadership and reliance on myth and rumor arise from the same cause, and, as in gregarious animals, we are all suggestible and never more so than when in danger." This is all understandable by the trained, observing veterinarian, who knows his herd psychology.

President Nathan B. Van Etten of the American Medical Association points out that medical education has lapsed below mediocrity in Germany. The medical course was cut to two years in 1939 and quacks and nature healers were legalized. Many scientists are in concentration camps.—*From Medical Times.*

SURGERY & OBSTETRICS
AND PROBLEMS OF BREEDING

Squamous Cell Carcinoma of the Bovine Horn*

E. R. FRANK, B.S., D.V.M., M.S., and LEE M. RODERICK, D.V.M., M.S., Ph.D.
Manhattan, Kan.

THE SQUAMOUS CELL carcinoma of the base of the horn is not a common neoplasm. Feldman[1] states that it does not seem to have been reported in America. It has been encountered, however, in India, for Bashford[2] noted its occurrence in work animals, usually at the base of the right horn, which was used to hitch the animals to the load. Hewlett[3] likewise encountered twelve carcinomas of the horn core among working bullocks at the Bombay Veterinary College. The observations on a case at the clinic of Kansas State College seem, therefore, to be worth reporting.

Fig. 1. Carcinoma of the horn.

The subject was a grade Shorthorn cow 9 years old, presented for examination with an unusual horn growth in December 1940. The owner stated that in April the normal horn had been injured and split for a short distance. The injured horn was loosened at its attachment to the head in July and from that time there was a rapid proliferation of horn-like tissue. The appearance of the growth, when the cow was examined, is shown in figure 1. It measured approximately 10 cm. in diameter at the base by 13 cm. in height with the horn still attached near the base of the growth. Palpation of the tissue revealed that it was sensitive to pressure at the base. The tissue seemed to be attached only to the skin, for it was slightly movable. The structure consisted of coarse parallel bundles of cornified material which could be separated easily with the fingers. The fibers were easily cut with a knife and a string (fig. 2) was necessary to hold the bundles in apposition after the tumor was removed.

The skin and subcutaneous tissue around the base of the growth was infiltrated with a 1 per cent solution of procain hydrochloride. The tissue beneath the base of the mass was likewise infiltrated with the local anesthetic solution. The growth was removed by making an incision through the skin around its base and leaving at least one-half inch of skin attached to it. All the tissue attached to the base of the tumor

*From the Department of Surgery and Medicine and the Department of Pathology, Kansas State College.

[1]Feldman, W. H.: Neoplasms of Domestic Animals (W. B. Saunders Co., Philadelphia, 1932), p. 299.

[2]Bashford, E. F.: Third Scientific Report on the Investigations of the Imperial Cancer Research Fund, London (1908), pp. 1-40.

[3]Hewlett, K.: Cancer of the horn core of cattle. J. Comp. Path. & Ther., xviii (1905), pp. 161-163.

Fig. 2. Left: the recurrent neoplasm. Right: the original neoplasm removed.

was dissected from the underlying bone. There was but little hemorrhage. The wound was treated in the usual manner.

The owner again presented the cow for treatment in May 1941. The examination revealed a structure similar to the one removed in December 1940, except that it was more regularly cone-shaped (fig. 2). It measured about 12 cm. in diameter at the base and about 14 cm. in height. The gross structure was essentially the same as that of the original neoplasm, although the coarse fibrous bundles may have been a bit more coherent. The tumor was again removed with the same technic as described for the first operation.

It was with some difficulty that a block of tissue that would hold together was secured from the base of the neoplasm. The coarse bundles of cornified material, with no matrix to hold them together, were poorly suited for histologic examination. Microscopic examination disclosed masses and cords of rather large squamous epithelial cells. No essential architecture was apparent, although the strands of cells seemed to be growing from within outward. The outer layers of those cells had a flattened, homogeneous appearance, the nuclei became indistinct and the cytoplasm was cornified or hyaline in appearance. This material stained rather faintly with eosin. Mitotic figures were fairly numerous near the center of the cords of cells. The diagnosis of a squamous cell carcinoma of the bovine horn with a recurrence within a few weeks seems, therefore, justified. Hewlett likewise commented on the rapid recurrence of the neoplasm after amputation and extirpation of the growth.

Marrow as an Avenue for Blood Transfusion

Blood transfused into the marrow of a long bone enters the blood stream and general circulation as rapidly as if injected directly into a vein. Marrow as a path for making blood transfusions is open for use when, on rare occasions, there is no superficial vein accessible as is the case in very young infants or in badly mutilated adults. In other events, the method has no advantage and is more cumbersome than the facile intravenous injection. The method is a lesson in physiology. It proves the close relation of marrow to the circulating blood.

Packing the wound of a compound fracture with sulfanilamide before applying the retention bandage is a common practice of the small animal field.

Typhus, wartime plague of the more serious type, is the subject of press dispatches from Spain, where strict measures for its control are being enforced. Beggars have been ordered off the streets and public conveyances.

Choriohemangioma of the Bovine Allantois-Chorion*

A. G. KARLSON, B.S., D.V.M., M.S., and MARGARET D. KELLY
St. Paul, Minn.

CHORIOHEMANGIOMATA (more commonly called chorioangioma) are described in the literature of human obstetrics as rare benign tumors of the placenta formed of proliferating endothelium and blood vessels in an embryonic connective tissue stroma. According to Marchetti,[1] they arise from the chorionic mesenchyma. In a comprehensive paper this author describes a number of types of chorioangiomas based on cellularity and differentiation. The most common type is of a loose connective tissue stroma supporting numerous small vessels lined with a single layer of endothelium. These vessels may be uniformly distributed, massed in clusters, or dilated to give a cavernous arrangement. A more cellular type is composed of compact masses of endothelial cells and chorionic stroma cells more or less embryonic in character. A third type has varying degrees of degeneration. The same tumor may have areas characteristic of each of the types.

According to Fisher,[2] there were but 221 authentic cases of chorioangioma of the placenta in human beings reported to 1940. This is said to be due to the fact that they have little or no clinical significance and are often overlooked.

A careful search of the literature failed to disclose reports of similar tumors in domestic animals. For this reason we wish to record the finding of a choriohemangioma in bovine fetal membranes. The term choriohemangioma appears to be more descriptive than chorioangioma, since it more clearly designates the formation of blood vessels.

REPORT OF CASE

A 2-year-old grade Holstein-Friesian heifer gave birth to a healthy male calf. The gestation period was of normal length and parturition occurred spontaneously. The fetal membranes were expelled soon after parturition without interference and brought to the laboratory for routine examination and bacteriologic study. They were normal except for the presence of a purplish, lobulated mass, 6 by 3 by 3 cm., attached to the fetal surface of the allantois-chorion by a narrow pedicle 2 cm. long. There was no apparent relationship to a cotyledon. It was firm in texture and

Fig. 1. The choriohemangioma (full size), showing lobulated appearance and surface of blood vessels.

covered with a smooth, glistening, thin capsule (fig. 1). The cut surface presented a fine, spongy appearance traversed by narrow bands of connective tissue up to 5 mm. wide. Blood oozed from the cut surface and was particularly abundant on compression.

Histologic examination of sections from several portions of the tumor showed the presence of capillaries of varying sizes and shapes in a loose fibrillar stroma (fig. 2). Many of the capillaries were so small that they contained only several erythrocytes. Some of the larger spaces filled with blood appeared to have several layers of endothe-

*Paper No. 1908, scientific journal series, Minnesota Agricultural Experiment Station.

[1]Marchetti, A. A.: A consideration of certain types of benign tumors of the placenta. Surg., Gynecol. & Obst., lxviii (April 1939), pp. 732-743.

[2]Fisher, J. H.: Chorio-angioma of the placenta. Am. J. Obst. & Gynecol., xl (Sept. 1940), pp. 493-498.

Fig. 2. Section through the choriohemangioma, showing various-sized blood spaces lined with a single layer of endothelium in a loose fibrillar stroma.

lium. It appears that buds of endothelium without lumina projected into the stroma from the capillary walls. There were also isolated groups of endothelial cells which appeared to have no lumina. The stroma had widely spaced stellate cells with long delicate processes. Some of these resembled the endothelial cells lining the blood spaces. There were rounded or cuboidal cells with a large amount of cytoplasm and deeply stained nuclei as compared with the more vesicular type of nucleus in the stellate cells.

It is not possible to say how commonly choriohemangioma occurs in animals. Since the fetal membranes of domestic animals are not often examined, this and other abnormalities are overlooked. In this laboratory 550 specimens have been carefully examined in the last ten years without disclosing any other structure recognized as similar to the choriohemangioma reported here.

Ovulation Time in Cows

Settling after service depends upon the sperm meeting the ovum in their march toward one another. If the two on the journey miss, the service was a failure. The time of ovulation is, therefore, of great importance and so is the sperm's rate of travel and duration of life. Thanks to studies made by the Wisconsin Agricultural Experiment Station, the time of ovulation is known to be from 10 to 18 hours after the end of the heat period and as a rule it requires from 6½ to 12 hours for the sperm to travel from the cervix to the upper end of the oviduct. From these figures the worker in artificial insemination is directed to make his calculation. In short,

the best time to inseminate is late in the heat period. Most cows are in heat from early morning to late afternoon. Late in the evening the period is over. Ten to 18 hours thereafter the ovum descends into the oviduct. Taking the law of averages as the guide, the ovum comes down to meet its mate 14 hours after the end of libido. This would mean that the ovum is ready and waiting for fertilization early the next morning. If the cow were inseminated the morning before (at the beginning of heat), the sperm would arrive at the further end of the journey too soon and would be dead before ovulation has laid an ovum across its path. Brought down to practical terms, granted the figures are correct, the best time to inseminate a cow or have her served by a bull would be in the afternoon. One of the unknowns, however, is the maximum duration of sperm life in the genital path.

Prolapse of the Male Urethra

ALTHOUGH prolapse of the female urethra occurs occasionally, I have recently had a case in the male. The subject was a 3-year-old Boston Terrier which has been used for stud purposes. The owner reported that the dog was suffering from a bleeding from the sheath that was not connected with micturition but occurred at various times during the day under excitement.

An examination of the extruded penis revealed a dark-red, pea-shaped mass protruding from the meatus. It was first thought to be a granuloma but on closer inspection, it was found to be the urethra. The protrusion contained the urethral orifice in its center. The hemorrhage came from this inflamed mass of everted mucous membrane.

As the use of astringents and manual reposition were futile the following procedure was carried out: An ordinary wooden applicator was inserted into the urethral orifice. Wrapped with cotton it was found that the prolapse could be easily replaced, but that it immediately recurred when the applicator was drawn out. So, with the applicator in the urethra as a guide, the meatus was encircled with a very fine twisted silk purse-string suture. That is, the urethral lumen was closed down to the dimensions of the applicator. Happily, the prolapse did not recur when the applicator was removed. It was interesting also to note that the hemorrhage immediately ceased and that the dog could urinate normally. The suture was removed in five days, and there was no further trouble.—*W. M. Firestone, D.V.M., New York, N. Y.*

Dark-red, pea-shaped mass protruding from the meatus.

Artificial insemination of cows is mounting in popularity. Numerous small breeding societies, similar in purpose to the larger coöperatives, are being organized throughout the country in excess of the supply of specially trained veterinarians to do the technical work. The further expansion of this field through small societies will depend a great deal upon the local practitioner's ambitions. Small groups can not afford to employ full-time doctors.

Any system of medicine that doesn't allow for the personal relationship between doctor and patient won't stand up.—*Health News.*

A good bird-dog field trial is one of America's grandest, cleanest, and healthiest sports. In fact, it is more than a sport; it's a thrill.—*Razz Walker in Tailwagger.*

CLINICAL DATA

Before using the word "biopsy" again, take a look in the dictionary.

A favorable ratio for the price of feed and livestock increases the production of both.

In the local treatment of wounds, sulfanilamide has largely replaced Carrel-Dakin solution of World War fame.

When giving animals sulfanilamide orally, feed them well, if advice handed down from the medical profession applies to animals.

Sulfanilamide has been found to be an excellent preventive of gas gangrene, the baneful sequel of battlefield injuries. It is also used by the military surgeons to prevent the pyogenic infections.

Sulfanilamide ointment, 5 per cent, has become an eye ointment of choice in the treatment of the conjunctiva in human medicine. Definitely beneficial results have been obtained in trachoma, famously incurable infection of the human eye.

The requirement for calcium is greater in early life and diminishes as the pig matures. In experiments carried out at the Kansas station, slow gains and poor growth were particularly manifest up to the fourth month.

Low calcium rations in pigs produce (1) anorexia, (2) unthrifty appearance, characterized by emaciation and rough coat, (3) unsteadiness of gait and finally posterior paralysis, (4) failure of growth, and (5) poor utilization of food.—*From Journal of Agricultural Research, lxii (May 1, 1941), p. 541.*

Salmonella typhi-murium was isolated in 8 out of 300 duck eggs examined by Kraneveld at the Veterinary Institute of Buitenzorg, Dutch East Indies. Further investigation as to this possible source of food poisoning is suggested.—*Ned. Ind. Blad. v. Diergeneesk., July 1940.*

While the nature of the hemorrhagic substance of spoiled sweet clover hay is still not known, workers at the Wisconsin station announce that it is free from the following classes of materials: fats, waxes, sugars, glucosides, water-soluble polysaccharides, water-soluble acids, amines, alkaloids, water-soluble proteins and water-soluble decomposition products of chlorophyls. Report is made of an unknown extractive that reduces the plasma prothrombin of standardized susceptible rabbits 10 per cent.—*E.S.R., June 1941.*

One of the newer sulfomide compounds is sulfaguanidine, which has gained some prominence in the treatment of human bacillary dysentery. In view of the tests of this drug in coccidiosis of fowl carried out at New York State Veterinary College[1] and the report of Merrick[2] to the effect that it possesses unusual merit in gastroenteric infections of dogs, it seems advisable to mention it merits.

The Ithaca report, although not held out as complete, which appears to show that sulfaguanidine has a pronounced "coccidiostatic" action in chickens, and Merrick's remarks to the effect that it has a markedly helpful action in the "mine run" of troublesome diarrheas of dogs, seem to be worthy of notice.

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[1]Levine, P. P.: The coccidiostatic effect of sulfaguanidine. Cornell Vet. xxxi (April 1941), pp. 107-112.

[2]Merrick, A. C.: Eastern Iowa practitioner's clinic, Waterloo, Iowa, June 17, 1941.

Euthanasia

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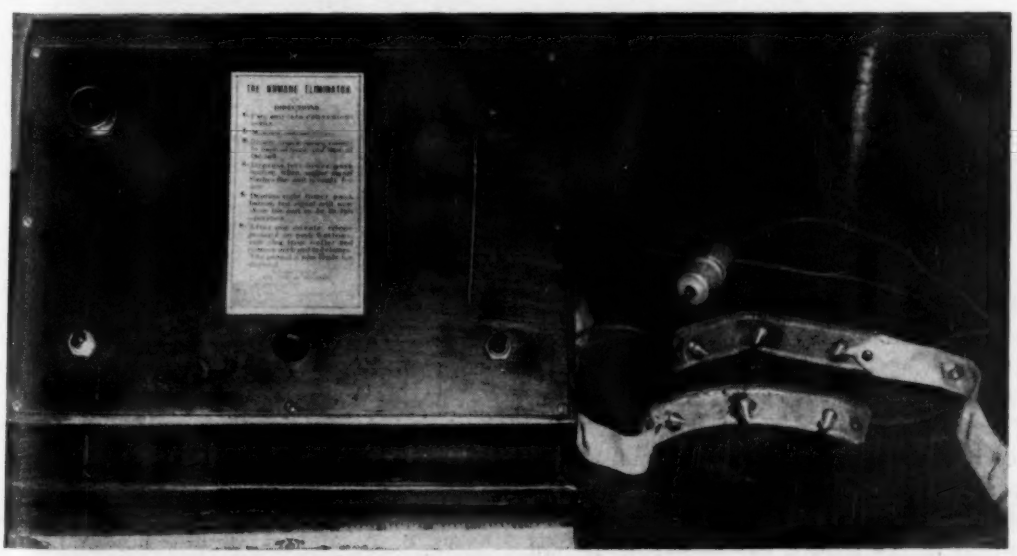
SOME YEARS AGO, the American Humane Association assigned me the task of studying euthanasia. I devoted a great deal of time and effort to this study and observed lethal apparatus in action, throughout the country, operated with such agents as electricity, chloroform, hydrocyanic acid gas, strychnine, shooting, carbon monoxide and various agents for intravenous use. My conclusion was that electrocution is the most humane of all these methods, for with proper apparatus it seems to take the life of an animal without distress. This statement is supported by scientific facts together with first-hand observations.

Since 1913, the Animal Rescue League of Boston has used a device called the "automatic electric cage." It is built in two sizes: one for dogs, another for cats or other small animals. This apparatus is safe, practical and economical to operate, but expensive to install, the cost running into a few hundred dollars.

*Managing director of The Anti-Cruelty Society of Chicago.

I have hoped for many years that someone would come forth with an electrocution apparatus incorporating convenience in application, safety for the operator as well as the bystander and, particularly, low cost in purchase and installation. I have seen several different kinds of electrocution apparatus, some from the United States and others from abroad, but they have all had two common faults: first, inconvenience, and second, danger to the operator or his assistant. One foreign apparatus requires shackles about the leg and neck enclosing the animal inside a "roll-top desk" crate—an inconvenient set-up. One of the simplest devices I have seen comprises a pair of wires with battery clamps on the ends which are attached to the skin at the base of the skull and the root of the tail; the apparatus is plugged into the ordinary household circuit of 110-volt AC current. But it is not safe because someone may accidentally plug it in first or grab the contacts while the current is on and be

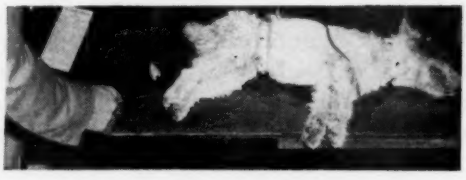


The humane eliminator.

The electrodes applied.

killed. 110 volts AC current will kill a human being if contact is made.

The most desirable apparatus would be a portable one so that the veterinarian could take it to his client's home and destroy a pet without removing it from home surroundings.



Death is instant—without distress.

Some humane societies are constantly searching for an inexpensive yet humane method of destroying surplus animals. These organizations must all have an inexpensive apparatus, preferably portable.

During recent weeks I have studied a device called the "humane eliminator" which will deliver AC current ample for prompt euthanasia. It may be operated direct from the household lighting circuit of 110 volts AC. Its cost is only a fraction of that of the automatic electric cage. The electrodes are applied to the animal's body in a way that safeguards the operator and assistant from accidental contacts. When applied to the animal the electrodes do not cause distress. I am of the opinion that this small, portable, inexpensive eliminator will be useful in the practice of veterinary medicine and in the conduct of animal shelters.

"Falling Disease" (=Copper Deficiency)*

"Falling disease" of cattle in southwestern Australia was definitely connected with copper deficiency of pastures and of the organs of affected animals. The syndrome consists of anemia and malnutrition, unthriftiness, stunted growth, breed degeneration, depraved appetite (ingesting subsoil), suspended estrum and sterility, rough coat, intermittent diarrhea, leg deformations, bony vegetation (metacarpal and metatarsal). Hemosiderosis, hypohemoglobinemia, glomerulonephritis and anemia are pathognomonic. The hemosiderosis is marked in the liver, spleen and kidneys.

There is a resemblance between "falling disease" of cattle and copper deficiency in lambing ewes, and although copper supplement prevents the disease and improves the health of affected animals, deficiency of that mineral is not assuredly the cause of death. It may be but a contributing factor, notwithstanding that the clinical evidence and comparative chemical analyses of the forage incriminate copper deficiency.

The farmer of Herefordshire, England, who was fined £149 (= $750) and two months at hard labor for slaughtering pigs without a license and for his failure to boil the swill he fed to his pigs, furnishes an example of wartime discipline in food production. *(Vide, The Veterinary Record,* May 3, 1941, p. 259.)

The fee collected for the treatment of a patient is less valuable than appreciation of work well done.

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*Bennets, H. W., Beck, A. B., Harley, R., and Evans, S. T. "Falling Disease" of Cattle in the South West of Western Australia. Australian Veterinary Journal, xvii (June 1941), pp. 85-92.

Diaphragmatic Hernia in a Dog*

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DIAPHRAGMATIC hernia is the entrance of an abdominal organ, or organs, into the thoracic cavity through a natural or an artificial opening of the diaphragm. It may either be congenital or acquired. In congenital cases the abdominal viscera make their passage through the foramen sinistrum (hiatus esophageus). An artificial opening of the diaphragm is, however, the passage in acquired cases, although organs may also pass through the hiatus esophageus.

The rupture of the diaphragm is usually brought about by severe contusions of the thorax, caused by being run over by vehicles, falling, or being struck by heavy objects. Fragments of fractured ribs may produce the lesion by penetrating the diaphragm. Violent abdominal contraction or anything that pushes the abdominal organs with great force against the diaphragm may likewise be a cause of the injury.

The intrusion of the abdominal viscera into the thoracic cavity usually occurs forthwith after the accident. It may, however, occur several days later, as in the case reported herein which was brought to the veterinary hospital, College of Veterinary Science, University of the Philippines.

CLINICAL RECORD

Subject.—Smooth-haired Fox Terrier, male, 2 years, 20 lb.

History.—Three days before the dog was brought to the clinic, he was run over by an automobile. After the accident there was partial loss of appetite, stiffness in walking, retching and voiding of bloody urine. He was presented at the clinic on January 7, 1941.

Symptoms.—On that day the dog was very weak, somewhat depressed and emaciated. The gait was stiff and the back arched. Micturition was accompanied by straining. The urine voided was scanty and deep yellow. The abdomen was normal in size but quite tense. Pain was evinced when the hind quarters and abdomen were palpated. The visible mucous membranes were normal and the nose was dry. Both the pulse and respiration were altered, the former being rapid and weak and the latter rather difficult and abdominal in character. The temperature, however, was normal (38.3 C.).

Not having arrived at a definite conclusion after a thorough examination, the dog was kept in the clinic for further observation. During his stay in the clinic, besides those symptoms already noted on the first day others were observed. There was inappetence at the start of hospitalization, but this was overcome. In spite of good appetite, he remained undernourished because after taking in a small amount of food at every meal, dyspnea occurred, a condition which prevented him from eating enough. The abdominal muscles became contracted, giving the animal a tucked-up appearance. He was seldom seen lying on the floor of the cage. Instead, sitting in an almost perpendicular position with the head extended and resting on the horizontal bars of the cage was the most usual position. Constipation was observed during the last week of hospitalization.

Diagnosis.—Diagnosis was not made until after several days of observation.

Treatment.—The treatment was entirely symptomatic. During the first few days, difficulty in micturition being marked, urotropin solution (0.5 Gm. dissolved in 20 cc. of water) was given *per os* every day. In an attempt to overcome the respiratory distress, and not knowing its cause at this time, white liniment was rubbed on the chest daily and a chest bandage applied. At the end of the first week the dog showed

*From the College of Veterinary Science, University of the Philippines.

signs of marked improvement; the urination became normal and pain was no longer noted on palpation of the abdomen and hind quarters. On the tenth day a prophylactic dose of antirabies vaccine (5 cc.) was injected subcutaneously. Due to a partial suppression of appetite, digestive tonic was given on the 13th day. This was continued up to the 16th day, after which a change was made. A mixture of equal parts of digestive tonic and milk of bismuth (4 cc.) was then given daily. On the 23rd day, constipation being noted, a potassium permanganate enema (1:1,000 solution) was given, and like the milk of bismuth, this was continued until February 4, when the dog was discharged. Two days later (February 6, 1941), in the house of the owner, after having a heavy meal that was composed mainly of bones, the dog died. He was autopsied immediately.

AUTOPSY FINDINGS

External Examination.—Rigor mortis was present. Emaciation was marked as indicated by the prominence of the ribs and other parts of the skeleton. A ball of feces protruded from the anus. At the preputial orifice there was yellowish-white mucus. The eyes were half closed and the mouth was open. All visible mucous membranes were cyanotic.

Internal Examination.—When the abdomen was opened, the peritoneum was found to be smooth and glistening, save at the right abdominal wall which was hemorrhagic where the liver rested. The muscular portion of the diaphragm was reddish brown. Both the muscular portion and the tendinous center were ruptured in a vertical direction at the median plane. The rupture was almost complete and extended from the sternum to about an inch from the dorsal attachment. Notwithstanding the healing process that took place, on account of the existence of interposed organs like the liver, duodenum and portions of the omentum, the edges of the wound were still widely separated. There were adhesions of the liver to the diaphragm. The intestines were dull white and they occupied practically all of the anterior portion of the abdominal cavity. With the exception of a portion of the duodenum, which passed through the rent of the diaphragm, slight changes in position were recognized. The liver had a dark, chocolate-brown color. Three of its lobes had passed through the rent. Incompletely healed wounds were seen on its surfaces. The gall bladder was dark blue and it was distended with bile. The pancreas showed hemorrhages on all of its surfaces. Only the right kidney was well developed. It was very much enlarged and bluish. The left kidney was represented only by a small nodule. The urinary bladder was almost empty. It contained only a small amount of highly colored urine. The stomach, spleen, three lobes of the liver and a portion of the duodenum were in the thorax.

When the thoracic cavity was opened, the parietal pleura, like the peritoneum, was found to be glistening and smooth. Certain parts, however, especially those covering the sternum and the posterior portion of the right thoracic wall where the herniated lobes of the liver were in contact, were markedly hemorrhagic. The stomach filled almost the entire cavity. It was distended with gas. Its greater curvature was directed to the left and its smaller curvature to the right. The part that was in touch with the sternum showed hemorrhagic spots. Its cardiac portion was found dorsally and close to the dorsal attachment of the diaphragm, a position very much posterior to its pyloric extremity. The esophagus, therefore, at its junction with the stomach, was folded. The greater omentum was lacerated and showed signs of hemorrhages. The three herniated lobes of the liver were immediately in front of the diaphragm and medial to the diaphragmatic lobe of the right lung. They were enclosed by a thin membrane and were partially necrosed. The spleen was found resting on the posterior surface of the sternum, immediately under the distended stomach. A wound, about an inch in length that was almost healed, was noted on its parietal surface. The heart was displaced. It was found entirely on the right

Fig. 1. The carcass with organs in situ after the abdominal and thoracic cavities had been opened. (1) Sternum, (2) diaphragm, (3) nonherniated portion of the liver, (4) herniated portion of the liver, (5) stomach, (6) spleen, (7) heart, (8) lungs, (9) pancreas.

side of the median plane, in contact with the right thoracic wall. The lungs were pale. Both lungs (left and right), with the exception of the apical and cardiac lobes of the left with a small portion of the diaphragmatic lobe of the same, were on the right side of the median plane.

Anatomico-Pathologic Diagnosis

The anatomico-pathologic findings were: diaphragmatic hernia, circumscribed peritonitis, circumscribed pleuritis, displacement of the heart, displacement of the lungs, necrosis of the liver, rupture of the liver, rupture of the spleen, lacerations of the greater omentum, cyanosis of the mucous membranes, pancreatitis, underdeveloped left kidney, hypertrophied right kidney.

Epicrisis

Probably, the rupture of the diaphragm and some of the abdominal organs was brought about by the automobile accident. The entrance of the abdominal organs into the thoracic cavity, however, did not occur immediately, as shown by the normal size of the abdomen of the animal when brought to the clinic. In the course of time, due to intraäbdominal pressure, the rent of the diaphragm became enlarged and, as a result, some of the abdominal organs gained entrance into the thoracic cavity. This was shown by the decrease in the size of the abdomen. This, however, did not cause immediate death, for the animal still lived for almost a month. After heavy feeding by the owner, the stomach probably was pushed more forward, so that folding of the cardiac portion of the esophagus occurred. This folding resulted in severe bloating or abnormal distention of the stomach, which in turn exerted undue pressure on the lungs, a condition that caused the death of the animal on account of asphyxia.

The American farmers' income for March 1941 was $688,000,000 compared with $604,000,000 for March 1940. The increase was mostly in farm animals and animal products.

Equine encephalomyelitis has occurred in all but four states in recent years. No cases were reported in New Hampshire, Pennsylvania, West Virginia and Tennessee, according to a report made by H. W. Schoening of the U. S. Bureau of Animal Industry.

Periodic Ophthalmia and Studies on the Possible Relationship to Brucellosis*

E. L. STUBBS, V.M.D., W. GRAHAM LOVE, V.M.D., and I. LIVE, V.M.D., M.A., Ph.D.
Philadelphia, Pa.

THE SUBJECT of this study was a halfbred yearling colt the dam of which was 3 years old in the spring of 1938, when the colt was foaled. Two months later this mare had an attack of "eye trouble," undoubtedly periodic ophthalmia. She was sold when the colt was 9 months old and at that time she was reported to have gone blind.

The colt developed "eye trouble" in both eyes in June 1939, when 1 year old. As described, the trouble consisted of sensitivity to light, marked lacrimation and swelling of the eyelids. The condition cleared in seven to ten days and was attributed to a "cold in the eyes."

A second attack occurred in July 1939 and was more severe in the right eye. A third attack, confined to the right eye, occurred September 1. A fourth attack occurred November 11. At that time we were notified and an examination was made. Each eye was flattened considerably and showed profuse lacrimation. There was photophobia and intense ciliary and conjunctival congestion. The changes were more severe in the left eye. The cornea was bright, somewhat gray and appeared oily. Short, bright-red blood vessels were visible along the superior limbus of the left cornea and similar shorter vessels in the right one. Both eyes showed hypopyon with filamentous exudate in the lower part of the anterior chamber and covering the iris as far as the inferior pupillary margin. The pupils in both eyes were contracted and there was a slight greenish-yellow glow from the fundus. No fundus image could be observed in either eye. A diagnosis of periodic ophthalmia was made.

*From the School of Veterinary Medicine and the School of Animal Pathology, University of Pennsylvania. This work was supported by funds from the Committee on the Diseases of the Eyes of Horses, American Thoroughbred Breeders' Association; the Pennsylvania Department of Agriculture, and the Pennsylvania Department of Health.

At the time of the examination the eyes of two other horses kept on this farm were examined and found normal. The owner stated that three to five horses had been kept by him on this farm for two years without suffering from any eye trouble until this mare and later the colt became affected. An adjoining farm was reported to have had horses with "moon eyes." One animal on that farm had been blind for ten years. Another, used for hunting the year before, was reported blind. Two others appeared normal.

The colt suffered a fifth attack on December 12, 1939. Arrangements* were made to obtain this colt for study and it was brought to the School of Veterinary Medicine on December 22, 1939, ten days after the fifth attack began. At this time the left eye showed marked enophthalmus, hazy cornea and slight ciliary congestion. The pupil was about half open, obscuring the fundus. The right eye showed noticeable ciliary congestion, moisture, pupil widely dilated from atropine, streaky exudate in the vitreous and a hazy fundus.

This colt suffered eleven attacks of periodic ophthalmia during the second year of its life. At that time the colt was destroyed because of lack of funds. The left eye suffered nine attacks, while the right eye suffered seven attacks. Five of these attacks involved both eyes simultaneously.

The attacks varied in severity, but usually left a more marked change in the posterior part of the eye and progressively interfered with sight. The acute symptoms cleared up in most cases, although one attack almost merged into another. Table I shows the course of events in the disease of this colt.

During this time we were interested in

*Arrangements were made to obtain this colt through the coöperation of the owner, Mr. Thomas P. Strittmatter, and Dr. E. C. Deubler supplied a horse to replace this one.

TABLE I—Course of Periodic Ophthalmia in the Affected Colt

ATTACK	DATE	RIGHT EYE	LEFT EYE	PHOTOPHOBIA	LACRIMATION	SWELLING	HYPOPYON
1st	June '39	+	+	+	+	+	—
2nd	July '39	+	+	+	+	+	—
3rd	Sept. 1, '39	—	+	+	+	+	—
4th	Nov. 11, '39	+	+	+	+	+	+
5th	Dec. 12, '39	+	+	+	+	+	+
6th	Jan. 16, '40	+	—	+	+	+	+
7th	Mar. 6, '40	+	—	+	—	—	—
8th	Mar. 26, '40	—	+	+	+	+	—
	Mar. 28, '40	+	—	+	+	+	—
9th	Apr. 10, '40	+	—	+	+	+	+
10th	Apr. 29, '40	—	+	+	+	+	—
11th	May 13, '40	+	—	+	+	+	+

+ Indicates presence of symptom in site designated.
— Indicates absence of symptom in site designated.

the relationship of brucellosis and periodic ophthalmia. Two of us (E.L.S. and W.G.L.) were performing agglutinative tests for brucellosis on as many cases of periodic ophthalmia as were available. Out of 40 horses tested, 6 were found with a slight reaction, but without evidence of relationship between the two diseases. Likewise, two of us (E.L.S. and I.L.) were conducting experiments on brucellosis in cattle. This provided Brucella organisms for agglutinative tests and for experimentation, and sonic filtrate for intracutaneous and ophthalmic tests.

Blood was drawn from this colt on January 9, 1940, at a time when the eye was quiet. It was tested by the agglutinative test, with negative result. At the same time a brucellergen* test also was applied, with negative result.

It was assumed that should brucellosis have any relationship to periodic ophthalmia it might be some form of sensitization. With this in mind it was thought that if sensitization were present the injection of a large dose of the sensitizing substance might induce active manifestations of the disease. Accordingly, on February 15, 1940, 3 cc. of killed *Brucella abortus* was injected intravenously for the purpose of attempting to shock this animal into an active attack

*The brucellergen used in these tests was supplied by I. Forest Huddleson, Michigan State College.

TABLE II—Tests and Experiments Conducted

DATE	EXPERIMENT	RESULT
Jan. 9, '40	Agglutinative test for brucellosis	Negative
Jan. 9, '40	Brucellergen skin test for brucellosis	Negative
Feb. 15, '40	3 cc. killed Br. abortus injected intraven.	
Mar. 5, '40	Agglutinative test for brucellosis	Positive, 1:600 + 4
Apr. 13, '40	Brucellergen skin test for brucellosis	Negative
Apr. 13, '40	Sonized Brucella filtrate skin test	Negative
Apr. 18, '40	Agglutinative test for brucellosis	1:25 + 4
Apr. 18, '40	3 cc. living Br. abortus inj. intraven.; temp. rise 100.5—102.2	
Apr. 29, '40	Agglutinative test for brucellosis	1:100 + 4
May 6, '40	Agglutinative test for brucellosis	1:50 + 4
May 6, '40	Sonized Brucella filtrate instilled into the eye	Negative
May 20, '40	Agglutinative test for brucellosis	1:200 + 4
May 20, '40	Brucellergen skin test	Positive
May 20, '40	Sonized Brucella filtrate skin test	Positive
May 21, '40	Sonized Brucella filtrate instilled into the eye	Negative
May 22, '40	Destroyed	

of periodic ophthalmia. Within an hour it was thought that the eyes were a little more moist. This manifestation, however, disappeared within the next hour and no other change occurred clinically or in the eye as seen by ophthalmoscopic study. Eighteen days later the blood showed agglutinins and reacted 1:600+4. Two months later, on April 13, this horse was tested intracutaneously with brucellergen and also with sonic filtrate of *Br. abortus*. Each test was negative. On April 18, an agglutinative test was made with a reaction of 1:25+4. It was considered desirable to inject living Brucella organisms. On April 18, 3 cc. of living *Br. abortus* was injected intravenously. Following the injection the eyes became moist and the temperature rose from 100.5 F. at 10 a.m., the time of the injection, to 102.2 F. at 5 p.m. No other changes were detected and ophthalmologically the eyes remained as they were previous to injection. On April 29, 1940, eleven days after the colt received the living *Br. abortus* culture, an agglutinative test reacted 1:100+4. On May 6, the agglutinative titer was the same. At this time sonic filtrate of *Br. abortus* was instilled into the eye, with negative result. On May 20, the agglutinative titer had risen to 1:200+4. Brucellergen then was given intracutaneously and at the same time sonic filtrate intracutaneously. Each test was positive. Following, sonic filtrate was instilled into the eye with negative result.

These tests show no evidence of relationship of brucellosis to periodic ophthalmia.

The colt was in good condition when destroyed on May 22. There was slight roughening of one of the smaller branches of the anterior mesenteric artery due to strongyles. The upper jejunum showed a little excess mucus and a small area at the end of the jejunum was reddened. The esophageal portion of the stomach contained about 60 bot larvae (*Gastrophilus intestinalis*). The cecum contained a few strongyles and there were large numbers in the folded colon. Both eyes were small, the left eye weighing 39 Gm. and the right one, 40 Gm. Each showed advanced periodic ophthalmia.

SUMMARY

A case of periodic ophthalmia is described in which there appeared to be eleven acute manifestations. The left eye suffered nine attacks while the right one suffered seven attacks. Five times both eyes were involved simultaneously. The attacks lessened somewhat in severity, but the changes in each eye were progressive and resulted in blindness.

Brucella abortus cultures were injected to investigate possible relationship to brucellosis, but none was found. Killed cultures produced agglutinins, but did not produce skin sensitivity. Living cultures produced skin sensitivity, but no evidence of sensitivity of the eye.

Preliminary Note on Hypertrophic Pulmonary Osteoarthropathy Associated with a Bronchiogenic Giant-Cell Tumor in the Left Lung

Hypertrophic pulmonary osteoarthropathy is a disease which, to the best of our knowledge, has never before been reported or described in American veterinary literature. It has, however, been reported and described in foreign languages. Cases in dogs, horses, lions and other animals have been reported by French, Belgian, Italian and German writers. The disease is not common in man. It is sometimes known as Marie's disease because of his publication in 1890.

In our case, a dog, the symptoms were loss of flesh in spite of a good appetite, cough which did not respond to treatment, and bony, symmetrical enlargements of the four limbs. X-ray of the chest revealed a large mass in the left lung and x-rays of the limbs revealed a hypertrophic periosteal thickening.

At a near date a complete report will be published which will contain a case report, several photographs, x-ray pictures of the lungs and limbs, and photomicrographs of the lung tumor and bone sections.—*Philip P. Poley, D.V.M., and J. Spottswood Taylor, M.D., Kingston, N. Y.*

The year 1941 will be America's best year for dogs.—*Dog World.*

An Attempt to Determine the Toxicity of Amsinckia Intermedia (Tarweed) for Fattening Lambs*

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BECAUSE of the wheat surplus in the United States during recent years, there has been a trend toward increased use of this grain for feeding livestock. *Amsinckia intermedia,* a common contaminate of wheat grown in some parts of the Pacific Northwest, has been proved to be toxic for horses, swine and cattle,[1] and to limit the usefulness as livestock feed of some of the wheat, especially the screenings from certain areas.

In a trial on a single lamb, McCulloch[1] did not observe icterus or hepatic cirrhosis upon autopsy, although the animal seemed to have died under mysterious circumstances. He did report finding subcutaneous hemorrhages. Such lesions are not uncommon in hogs suffering from *A. intermedia* seed poisoning, but McCulloch attributed these lesions to some "unexplained accident." This animal had received a ration containing *A. intermedia* seed for 91 days. This is about the average period required to fatten lambs on grain.

In view of the increased use of wheat for fattening lambs, it was considered expedient to test further the toxicity of *A. intermedia* seed for lambs.

EXPERIMENTAL WORK

Four lambs of mixed breed were selected for this experiment. They were divided into two lots as follows. Lambs 15 and 14, weighing 70 and 80 lb., respectively, were placed in lot I. Lambs 5 and 20, weighing 70 and 82 lb., respectively, were placed in lot 2.

The *A. intermedia* seed fed was obtained from two Oregon counties where hepatic cirrhosis is common to hogs fed on wheat screenings. Roughage consisted of alfalfa hay.

In order to accustom the lambs to eating grain, both lots were fed 4 oz. of wheat per head daily for 22 days. During the next six days lot I received 8 oz. of a mixture consisting of 75 per cent wheat and 25 per cent *A. intermedia* seed; lot II received 8 oz. of wheat per head daily. The following six days lot I received 12 oz. per head daily of the seed mixture (wheat, *A. intermedia*); lot II received 12 oz. of wheat per head daily. The last 128 days of the feeding trial lot I received 1 lb. daily per head of the seed mixture (wheat, *A. intermedia*); lot II received 1 lb. of wheat per head per day.

The grain ration was apparently consumed with relish except for two days following the increase from 12 oz. to 1 lb. when lambs 14 and 15 ate all of the wheat, but left some *A. intermedia.* This was consumed on the following day. All of the lambs remained apparently normal throughout the experiment.

At the end of the feeding trial, 140 days after the first feeding of *A. intermedia,* the lambs had made the following gains: No. 15, 30 lb.; No. 14, 41 lb.; No. 5, 50 lb.; No. 20, 40½ lb. No attempt is made to explain why lamb 15 made a comparatively small gain. It is known, however, that the lambs were moderately infested with stomach and intestinal parasites.

At the end of the feeding period, the animals were slaughtered and examined. No evidence of hepatic cirrhosis or other pathological lesions were observed and no off flavors could be detected in either liver or other parts of the carcasses prepared for human food in the usual manner.

DISCUSSION

It is realized that the number of animals used in this experiment is too limited to

*Technical paper No. 383 of the Oregon Agricultural Experiment Station; contribution from the Department of Veterinary Medicine, Oregon State College.

[1]McCulloch, E. C.: Hepatic cirrhosis of horses, swine and cattle due to the ingestion of seeds of the tarweed, *Amsinckia intermedia.* J.A.V.M.A., xcvi (Jan. 1940), pp. 5-17.

establish that *A. intermedia* seed is not toxic to some sheep, especially if fed a long period of time. Since the fattening period of feeder lambs is considerably shorter than of those fed in this experiment, however, and is likewise much shorter than the period required to grow and fatten hogs, it appears that wheat screenings containing *A. intermedia* seed are better adapted to the fattening of lambs than to the growing and fattening of hogs. This view is supported by the fact that difficulties in fattening lambs on wheat screenings have not been reported in areas where hepatic cirrhosis is common in hogs fed the same feed.

SUMMARY

Wheat containing 25 per cent *Amsinckia intermedia* seed was fed to two lambs as a fattening ration for a period of 125 days. The lambs remained apparently normal throughout the feeding period and no evidence of pathology was observed upon autopsy. Wheat screenings containing *A. intermedia* seed appear more suitable for the fattening of lambs than for other livestock feed.

No off flavors were detected from parts of carcasses prepared for human food in the usual manner.

An Unusual Personal Injury

Teachers of veterinary surgery warn their students about the hazards of practice. Whether an animal is reputed to be gentle or wild and vicious, the warning is to keep this phase of practice foremost in mind in approaching and handling patients. As a rule, personal injury is sustained from the average animal in using its natural instincts which the doctor did not take into account. To be intentionally emphatic and not seemingly rude, the cause is more often chargeable to incompetence rather than to accident. Knowledge of animal behavior is the preventive and this is as much a part of the student's training as is knowledge of the functions of bile.

One can get kicked to death by a gentle animal, crushed by its ponderous body, mauled by a tractable bull, ripped in the face by a harmless pooch, or torn by the claws of an innocent cat. The minor injuries, however, are the most numerous and, that being true, they are serious in depriving communities of a veterinary-medical service while the injured are disabled.

TWO UNUSUAL ACCIDENTS

While treating some cattle recently a prominent Iowa veterinarian was thrown into the cutting units of a disk (= a tillage implement) and suffered a mutilated gash in the leg. The moral here is not to wrestle with animals where the surroundings are not clear of such impediments.

A stranger accident reported the other day is the actual inspiration for this thesis. A practitioner lost an index finger while tying a horse to the manger after having completed an operation. While tying the rope halter shank to the ring in the manger, the horse still flustered from the operation, pulled back and caught the doctor's index finger in a noose of the knot and crushed it beyond redemption. Although the shank was quickly cut by a bystander, it was still a tedious job to release the finger from the tightly drawn knot. Crushed to a pulp, the finger was amputated at the first interphalangeal articulation. A similar accident occurred to a hostler at the Chicago stockyards several years ago.

Save That Mare, Doctor

A prominent practitioner in Iowa writes that the better class of farmers—the thoughtful kind—are paying considerable attention to their horses, particularly to mares which may be needed for breeding. One of them is quoted as saying: "Take good care of that mare, Doctor, I am not so sure that I can afford to go on spending so much money for machinery."

Interviewed at the Eastern Iowa clinic as to this train of thought in the minds of farmers, an officer of the state association and well-known practitioner declared that the use of more horses on Iowa farms seems to be inevitable. The laws of economics, he believes, will govern the trend.

EDITORIAL

The Shortage of Veterinarians: A Challenge to Our Educational System

A SHORTAGE of veterinarians in the United States has been widely annunciated. Newspapers and magazines from coast to coast have published impressive articles on that subject and, for the first time in veterinary history, informed the public about the place veterinary science occupies in the nation's affairs. Various agencies have studied the question with due care and have handed down their decisions. These agencies are:

a) Selective Service System

b) Veterinary Corps of the Army

c) U. S. Bureau of Animal Industry

d) American Veterinary Medical Association

e) Senate Committee on Military Affairs

All of these, in various ways, have endeavored to tell the general population that the veterinary service *pondere non numero* is a significant force in national welfare, more especially now that the country is preparing for total mobilization of its strength.

Assuming that the wisdom of these groups is sound, the present veterinary educational system is suddenly placed in a position of tremendous responsibility. It must either take steps to relieve the shortage or else admit its lack of capacity in a national emergency, and then stand aside while the nation protects itself from the danger of the deficiency pointed out.

The difficulty of getting enrolled in a veterinary college has become too grave to be passed off indefinitely with excuses about spending taxpayers' money for the education of "foreigners." The welfare of the United States is at stake, and the existing accredited colleges accepted a national obligation when the founders of veterinary education in America bowed their way out of the educational field.

That a sense of responsibility exists was shown at the University of Illinois, which after disapproving the addition of a veterinary division last year, parries criticism by announcing a "pre-veterinary training" curriculum, notwithstanding that the trainees may not have a ghost of a show at the door of a veterinary college granting the degree of D.V.M. toward which the University is luring them. Nothing could more emphatically reveal the prevailing sense of responsibility than this sudden stroke of chauvinism. The University of Illinois, representing public education in the greatest of the livestock states, is urging "veterinarians, farm and home advisers and vocational teachers in agriculture" to send students to the University to pursue what it calls "two years of pre-veterinary training." *(Vide,* page 171.) This it does without concurrently providing the means of finishing the education the young men of Illinois are invited to start. Neither the reason nor the justice of the allurement is clear. Since this university, after a declared study, disapproved the founding of a veterinary division that would grant the conventional degree, it is not easy to admit the fairness of training young men for colleges in other states that are pretty sure not to accept them.

Inasmuch as the competent groups named above have signalized a shortage of veterinarians and also the danger thereof to the people's supply of food, the Association is obligated to bring the facts to the attention of our veterinary educational system. To

a great livestock state such as Illinois, the duty in this regard is self-evident and, certainly, that duty is not preparing veterinary students for other states to educate.

The 60-year-old state association of Illinois in coöperation with public health experts has declared that the state needs a veterinary college that will close the gap once filled by private enterprise — by the actual founders of veterinary education in this country. What Illinois needs is a complete course in veterinary medicine, not a subterfuge. Under present conditions, it is unfair to the young men who enter and, assuredly, of no use to either the veterinary profession or the country. Ample facilities in colleges properly qualified to train men of high caliber for the the degree of Doctor of Veterinary Medicine are the nation's needs. Until these are furnished, pre-veterinary training will only take the veterinary service in the wrong direction.

California Comes to the Rescue

A bright spot in the troubled sky is a letter from C. M. Haring, Berkeley, Calif., dated July 16, 1941, announcing that a professional course in veterinary medicine will henceforth be given by the University of California. The announcement, entitled "Professional Training in Veterinary Medicine," reads:

> With the signing of Assembly Bill 15 by Governor Olson on July 9th, it now becomes possible for the University of California to offer a professional course in veterinary medicine. Although the various details of the new curriculum are still in the preliminary stages and the necessary administrative and academic procedures yet remain to be formulated, it can be announced that, beginning with the entering class in August 1941, a six-year course of study leading to the degree of Doctor of Veterinary Medicine will be inaugurated.
>
> The first three years of the course will follow closely the present curriculum in animal science in the College of Agriculture. Although it is recommended that all of the first three years of the course be spent in residence at Davis because of the close relationships between veterinary medicine and animal, poultry and dairy industry, the first and second years may be spent in the University of California at Berkeley or Los Angeles, or in a junior college or other collegiate institution. The third year must be spent at Davis. The third year will contain certain courses not included in the animal science curriculum but which, nevertheless, will be acceptable as electives toward the B. S. degree in this curriculum, for those who do not continue in the veterinary program. The bachelor's degree also will be conferred at the end of four years upon students enrolled in the veterinary course, after which two more years of graduate work will be required for the doctorate in veterinary medicine.
>
> As in the Medical School, the number of students admitted to the professional veterinary courses will be limited, preference being given to residents of California who have attained high scholastic standing and who show particular aptitude for veterinary medicine. Applicants who fail to gain admittance to the professional veterinary course may, if they desire, proceed with the fourth and last year of the animal science curriculum without loss of time.
>
> Time and future appropriations will be required to complete the physical facilities that will be needed for the professional courses and to assemble the staff. It is expected that these will be added year by year as the freshman class entering in August 1941 progresses through the six-year course. It will not be possible, therefore, to accept students with advanced standing for the present.
>
> A tentative announcement of the course requirements will be issued shortly before registration on August 21st.

This development is one that can be welcomed as a step in the right direction. Assurances of a capable faculty, splendid teaching facilities, and ample support for research so indispensable to progress, all under the direction of a group of veterinary scientists whose abilities are already recognized, plus the stability and resources of an established institution—of which the University of California is an outstanding example—promise much for the future.

Rumor of a New Illinois Veterinary College

In the wake of this announcement comes the rumor that a new veterinary college with an unquestionable affiliation will open in central Illinois not later than January 1, 1942. In the absence of an authorized release to that effect, nothing more can be published on the authenticity of that bit of news at the present moment.

Resent "Livestock" Rating for Dogs

CERTAIN SPOKESMEN for dog fancy resent the implication that the dog is livestock and as such should be subjected to the regulatory laws governing the handling of domestic animals to the best advantage of the people. The contentions against that rating are that the laws of economics and public health applying to the animals of the farm should not be enforced against the dog because of sentimental values. Quoting from *Kennel News Bulletin* of May 26, 1941:

"To do so would reduce him [the dog] to the status of the cow, the sheep and the hog, and other animals. . . . It would bring an end to the household rights of the owner and his dog. . . . It would place the dogs of this country under a veterinary dictatorship . . . the owner would be compelled to submit his dog to such treatment as might be ordered by the American Veterinary Medical Association. . . . It is obvious that the government, officials, serum makers, and veterinarians who caused these resolutions to be passed were intent upon obtaining the widest possible control over the dogs of this country."

The writer further contends that the Bureau of Animal Industry, U. S. Department of Agriculture, is obviously looking forward to the collection of $30,000,000 through the 15,000,000 taxable dogs in this country, and that the "must rulings" of the government would increase the earnings of the veterinarians to a comparable degree. Throughout, the "great love and devotion" of the dog for man is invoked as the reason for letting the dog go and come and do as he pleases, and organizing a national association for that purpose in "these times of danger" is advocated as a means to that end.

To all this, there is but one answer. All of the great steps taken by the veterinary service (federal, state, private) to prevent the United States from sinking to the level of a subject nation by making it self-contained through the sensible handling of animals, have met with the same type of opposition—opposition that makes these perturbations of the less thoughtful sponsors of dogdom seem like a pleasant dream, and yet there you are. Animal tuberculosis is under control and crippled children are fewer, tick fever is on the way out and a great agricultural and industrial South is the reward, hog cholera which sapped wealth from the people by the millions per annum is passing to the *oubliette*, a billion-dollar poultry industry which once resented any intrusion of the veterinarians is now pleading for more and better veterinary aid. These are but the "seen" benefits of the alleged dogmatism of the veterinary service which has made a real United States of America. That precious "household right of the owner and his dog" may be a great power but it never can keep the general population from invoking the blessings of science. There are painful stages (to a few) in all great reforms but in the end even these few are thankful that their obstructive ways were futile.

Correction

Through the miswording of a newspaper clipping from which information was gleaned for an item in the June issue of the JOURNAL, J. L. Arnandez, formerly an inspector on the Memphis force of the U. S. Bureau of Animal Industry, was represented as spending week-ends in practice at Como, Miss., when the fact is that he entered private practice at Como after resigning from the Bureau. Because Bureau veterinarians are not permitted to practice as a sideline under any circumstances, both the Bureau officials and Dr. Arnandez are entitled to our apology.

The veterinary profession is pledged to the task of preventing the food supply of our country from sinking below the level of the people's needs, a level to which it would quickly fall were animal diseases allowed to spread unchecked or their control permitted to fall into antiscientific hands.

WITH THE EDITORS

The Channels of Trade for Veterinary Remedies

THE REMEDIES employed in the practice of veterinary medicine reach the consumer in three ways:

1) *Through veterinarians licensed by state boards of examiners.* Because of the progress veterinary science has made and the important place it occupies in the country's affairs, this channel of trade has created two widely separated groups, namely (a) the graduates of recognized veterinary colleges, who maintain veterinary-medical societies to fix the technical qualifications for those who practice in any branch of the service, and (b) the non-graduates, who are legally but not technically qualified in the conventional gradation.

2) *Through the general drug trade,* where they reach the consumer either by direct over-the-counter sale or through the professional man's prescription. In the case of veterinary products, this channel has been pronounced objectionable by veterinarians because direct sales, which are said to be numerous, are a usurpation of the professional man's "personal property" —his practice. The veterinarian licensed and qualified has a priority right in his field, the field of veterinary practice in his community.

3) *Direct sales to the consumer* by the producer or jobber, generally by means of traveling salesmen, circularization or advertising in periodicals of the lay readers. This is the main channel of the nostrum industry, the channel of veterinary quackery which all thoughtful men deplore. Except to say that its ways are now and always have been dubious and shady, that channel is no part of this theme.

Veterinary supply houses who vie only for veterinarians are the inevitable outgrowth of the drug trade's absolute disrespect for the welfare of the veterinarian and of its misunderstanding of the part a scientific veterinary service plays in the security of our vast agricultural interest and of its relation to national existence. The sick animal was there to exploit over the heads of the professional man striving to form a competent veterinary service based upon the knowledge of medicine. So, the veterinary profession was driven to create its own druggists. These druggists are the group of prosperous veterinary supply houses started, operated and chiefly owned by veterinarians, or outstanding producers who maintain veterinary departments manned by veterinarians. Those who choose to limit their trade to graduates of recognized colleges are certainly entitled to the applause of the veterinarians in that class, yet paradoxical as it may seem, the support is by no means universal among them.

A letter just received from a large producer of biologic products points out how graduate veterinarians sometimes make purchases for the actual purpose of passing them on to less loyal distributors. The debt the whole veterinary service owes to its colleagues in the commercial field, who support organized veterinary medicine to the full extent of their ability, should not be so easily forgotten by the graduates of veterinary colleges who wish to be loyal to themselves, their profession and to their country now that these "veterinary druggists" are being called upon to fill a place in national defense that would be empty indeed without them.

This is not one of those outmoded pleas for readers to patronize advertisers. It is a plea for graduate veterinarians to aid, not hinder, the development of a competent veterinary service.

CURRENT LITERATURE

ABSTRACTS

Veterinarians in Public Health Work

The address of Veterinary Director General Cameron of the Health of Animals Division, Department of Agriculture, Dominion of Canada, reviews the connection of veterinary science to public health work from the founding of systematic veterinary education in the Dominion in 1862 to the present time. The close relation of health of animals to public welfare is told in various quotations from prominent scientists in both fields: Calmette, Bowen, Bell (A. N.), Fishbein, Rutherford, Michenor, Smith (Theobald), Curtice, Kilbourne, and others. Quoting John R. Mohler on the part played by the livestock industry in modern life, the author repeated that without livestock, agriculture could not succeed, and emphasized that:

> A single cow has produced 37,000 pounds of milk in a year. Spencer states that of the 1,600 pounds of food used by the average American, one half is derived from cattle. . . . Many products enter daily use. From casein we have buttons, buckles, billiard balls, clothing, paint and coating for fine paper. Leather is the source of shoes, suit-cases, pocket books, coats and harnesses. Hair is used in upholstery, mattresses, cushions, plaster and fine brushes. Many so-called camel hair brushes are made from the fine hairs inside of the cow's ear. . . .

The discourse goes on to enumerate the endless list of everyday commodities furnished by animals to "advance civilization and the progress and welfare of human beings."

Mentioned among the threats to public health that the veterinary service is delegated to master in animals are anthrax, rabies, tuberculosis, glanders, brucellosis, encephalomyelitis, swine erysipelas, actinomycosis, tularemia, psittacosis, trichinosis, scabies and ringworm. The victory of the Dominion veterinary service over rabies and glanders and the organized effort to bring bovine tuberculosis and brucellosis under still more complete control are explained. [*Cameron, A. E. Public Health. Canadian Journal of Comparative Medicine, v (April 1941).*]

A Study of Ketosis in Dairy Cattle

The urine from over 1,500 dairy cattle was tested for ketosis with the sodium nitroprusside method. Although only a very few of these animals showed clinical signs of ketosis, the urine from 456 gave a 4-plus reaction to the above test. An analysis of the blood from each of the 456 animals showed that blood ketones in excess of 6 mg. per 100 cc. of blood were usually accompanied by a slight decrease in blood sugar. This, the authors feel, suggests that either faulty carbohydrate metabolism or insufficient available carbohydrates predisposes dairy cattle to ketosis. They doubt if it is the former because the injection of glucose usually gives a prompt but temporary relief. They point out that ketosis is more likely to occur in high producing cows during the winter months when the forage contains less sugar than is found in pasture crops. These observations and the fact that corn sugar or molasses added to the ration of cows with severe ketosis results in marked improvement, lead the authors to suggest that the usual rations of dairy cows contain only enough available carbohydrates to meet ordinary requirements. The extra demands on carbohydrates for high milk production causes a lowered blood sugar level leading to an incomplete oxidation of fats and the development of ketosis. The authors failed

to find the acidosis and the very low blood sugar levels which have been reported by other workers and suggest that the other investigators were probably working with more severe cases of ketosis. [*Sykes, J. F., Duncan, C. W., and Huffman, C. F. Blood Sugar and Carbon-Dioxide Combining Power of Plasma in Relation to Ketosis in Cattle. Journal of Dairy Science, xxiv (Mar. 1941), pp. 193-197.*]

H. J. M.

Phenothiazine in Emaciated Horses

Report is made of the use of phenothiazine in emaciated horses: light horses, grades and Hackneys in bad condition. The after-treatment red cell counts in three cases chosen as examples were, respectively (per cmm.), 1,450,000, 2,180,000 and 2,290,000. Two untreated horses chosen to study the blood picture had an erythrocyte count of 5,500,000 and 8,800,000, indicating that one of them was decidedly anemic. A thin, stunted, half Thoroughbred filly weighing 600 lb. with a red cell count of 6,300,000 two days before treatment (March 13) was given 35 Gm. of the drug in her feed. Except for a slight loss of appetite the next day, no symptoms appeared. Three days later (March 18) she received *per os* 50 Gm. from the same lot of phenothiazine. On March 21, except for more pallor of the mucous membranes there was nothing abnormal. The filly showed no icterus and she was hungry. Her red cell count was 4,900,000 March 18; 4,500,000 March 21; and 4,160,000 March 28.

Conclusion: (1) This emaciated filly was able to stand phenothiazine. (2) The above data in no way condemn phenothiazine in handling the parasite problem of horses. (3) Horses showing extreme anemia, emaciation and possibly infectious anemia are not good subjects for this treatment. (4) The degree of anemia a horse must have to be a risk is not known. (5) No method of removing strongyles in emaciated, poorly nourished horses is safe. [*Fincher, M. G., and Gibbons, W. J. Phenothiazine in Emaciated Horses. The Cornell Veterinarian, xxxi (April 1941), pp. 220-223.*]

Mastitis Therapy with Colloidal Silver Oxide

Novoxil liquid, a colloidal dispersion of silver oxide in a light mineral oil, was used in the treatment of 23 cows with 67 quarters infected with *Streptococcus agalactiae*. Ten of the animals showed clinical symptoms of catarrhal (chronic) mastitis in 19 infected quarters. Novoxil liquid containing from 2.5 to 10 per cent of silver oxide was injected into the infected quarters. Five to 20 cc. was injected one to ten times at intervals of 12, 24, 48 and 72 hours, the concentration, quantity and number of injections being the same for each infected quarter treated in an individual cow.

The *S. agalactiae* infection was destroyed in 59, or 88.1 per cent, of the infected quarters. The infection was destroyed in all infected quarters in 19, or 82.7 per cent, of the cows treated. Ten, or 52.6 per cent, of the quarters showing clinical symptoms recovered from the symptoms and the infection was destroyed. The clinical symptoms and also the infection disappeared from all of the quarters in five, or 50 per cent, of the cows showing clinical symptoms. These results were obtained in most cases with a single course of treatment. Three to five injections of the 5 per cent concentration at intervals of 24 hours appeared to give the best results, but these statements should not be regarded as conclusive because of the limited number of cows involved.

Swelling of the udder and a change in the appearance of the secretion occurred in all cases following the injections, but these changes were only temporary. The greater quantity of the silver injected into a quarter was eliminated in about five days following the last injection, but traces were present in the milk for several weeks. [*Klein, L. A., Kleckner, A. L., and Biltz, R. O., School of Veterinary Medicine, University of Pennsylvania. Effect of Novoxil Liquid on Catarrhal (Chronic) Mastitis and on Streptococcus Agalactiae Udder Infection. American Journal of Veterinary Research, ii (April 1941), pp. 145-151.*]

Anaerobic Flora of the Gall Bladder of Healthy Cattle

The authors found anaerobic bacteria in the bile of healthy slaughtered cattle coming from the interior of Java. For these investigations the gall bladder was removed immediately at the time of slaughter. In 1934-1936, anaerobes were demonstrable in 9 out of 50 specimens examined and the same results were obtained in 1939-1940. Among the organisms isolated were *Bacterium welchii, Clostridium septicum* (vibrio septique), *B. purificatus tenuis* (Zeissler), *B. amlobacter* (Gruber), *B. multifermentans* (Stoddard) and *B. cochlearis* (Douglas). While liver flukes were found also, there did not seem to be any connection between the two. [*Kraneveld, F. C., and Djaenoedin, Raden. The Presence of Anaerobic Microörganisms in the Gall Bladder of Healthy Cattle. (Title trans.) Nederlandsche Indische Bladen voor Diergeneeskunde, Buitzorg, Java, lii (Oct. 1940), pp. 281-291.*]

C. H.

Swine Erysipelas in Turkeys

Data on swine-erysipelas infection in 16 flocks of immature turkeys of various ages show that the epizoötiology of the disease in turkeys is highly variable and erratic. These outbreaks have been observed over a period of 2½ years and involve a turkey population of about 30,000 birds. The most constant features observed were that all outbreaks occurred in the fall and winter months and that affected birds were predominantly males. Data on morbidity, mortality, transmission, duration of the outbreaks and the effect of management factors are discussed.

Bacteriologic studies of *Erysipelothrix rhusiopathiae* from turkeys and gross pathologic changes produced by this infection are annotated. The use of these factors in the diagnosis of the disease is discussed.

Results of the use of anti-swine-erysipelas serum on sick birds under controlled field conditions and on birds under laboratory conditions are presented. These results indicate no practical value from the use of the serum. [*Rosenwald, A. S., and Dickinson, E. M., Oregon Agricultural Experiment Station. Swine Erysipelas in Turkeys. American Journal of Veterinary Research, ii (April 1941), pp. 202-213.*]

Vitamin K

The years 1934-1935 will always be regarded as landmarks in the history of coagulation of the blood because of the discovery of vitamin K by Dam through having observed that prothrombin is often low in quantity in cases of obstructive jaundice. Subsequent studies proved that this observation was exact and that it applies not only to cholemic bleeding but also to other hemorrhagic tendencies, particularly to the hemorrhagic diathesis of the newborn which later (1939) was shown to be due to a prothrombin deficiency that responds favorably to vitamin K injections.

Chemical studies of this vitamin have been revealing. Its chemical structure has been determined. Three fractions (K, K_1 and K_2) have been synthesized, and their uses described. In effect, their uses are limited to pronounced prothrombin depletion, a state that is uncommon in adults because vitamin K has a wide distribution in plant life and is therefore ample in the diet beyond early childhood. Being fat-soluble, bile is required for its absorption by the intestine. Inadequate supply of bile in the infant and in the adult affected with obstruction of the flow of bile into the lumen of the intestine, explains the conditions responsible for vitamin K (prothrombin) deficiency. This being the case, the administration of vitamin K must be accompanied with bile salts in order to insure the entrance of it into the blood. Hypothrombinemia, therefore, may also be associated with hepatic injury other than obstruction. Vitamin K is ineffective against purpuras, hemophilia and the usual run of hemorrhagic diseases. On the other hand it is specific against hypoprothrombinemia of infants and of adults due to obstructive jaundice. (*Editorial, Bulletin of Lederle Laboratories, ix (Jan. 1941), pp. 3-9.*)

BOOK NOTICES

Animal Pathology

The popularity of books of that class is shown by the publication of the second edition of Runnell's *Animal Pathology*, in enlarged form, after a lapse of but two years. Besides being enlarged and newly illustrated, the second edition has new features useful in the everyday work of the practitioner, and inasmuch as the text brings the knowledge of domestic animal pathology abreast with the times, its continued popularity is assured.

Pursuant to a custom that appears to reign among the authors at Iowa State, the utilitarian side of the ground covered is told without departing from the conventions of scientific literature. Although this book is intended to prepare students for the clinical application of pathology to their subsequent studies, the material, in the manner presented, is a reminder that pathology is an evolutionary science that is inseparably dovetailed into clinical work.

Part I, containing 224 pages on general pathology, has been rearranged and revised. The chapter on deficiency diseases, for example, had to be practically rewritten owing to the rapid developments in that phase of pathology. Although necessarily brief in a book extending over the whole field of pathology, the main vitamin and mineral deficiencies are sketched and a list of well-chosen references is given. The chapters on calculi and tumors are reviews of the known facts about these two more or less incomplete studies.

Part II, entitled "Systemic Pathology," describes the more common diseases affecting the different apparatus (organs). Here, the author departs from the usual custom by including functional disturbances with the view of showing their relation to the structural alterations of actual pathology.

Part III, the "Special Pathology of the Specific Infections," includes practically all of the important infections of domestic animals encountered in the practice of veterinary medicine. The virus infections as understood in 1940 are well particularized.

The appendix is a clinician's paradise. The technics of laboratory diagnosis are brought up to date. These comprise the blood, urine, fecal and skin examinations in general use. [*Animal Pathology. By Russell A. Runnells, D.V.M., M.S., Associate Professor of Veterinary Pathology, Iowa State College. 590 pages. 184 illustrations. Cloth. Collegiate Press, Inc., Ames, Iowa. Price $6.00.*]

The Principal Nervous Pathways

This is a manual of schematic drawings and captions describing what the title promises in a way more comprehensive than could be done in many more pages of textual reading. The book is an example of a trend to revive, in the medical curriculum, the critical study of neurology which was abandoned to some extent since microbiology and other studies diverted the mind from the anatomy and physiology of the nervous system. Otherwise stated, *The Principal Nervous Pathways* is an expedition athwart difficult terrain to restore the nervous system to its proper place in clinical medicine—to bring its anatomy and physiology and their relation to diagnosis, pathology and therapeutics back into the realm.

Where the old teachers held out neuroanatomy and neurophysiology as basic studies, the new school of recent decades went hunting in other directions. Structure and function and the physical influences affecting them (parasites, exogenous agents, food) took the lead without comparable attention to the system regulating them. In human medicine the nervous system was left to the psychiatrist; in veterinary medicine it became a blackout. The fact that the abnormal phenomena we see and the things we do to correct them are largely governed by the conductions of the

brain, cord, ganglia, nerves and their autonomic accessories, which ramify into every nook and affect every vital process, has been forgotten at the expense of this fundamental medical science.

While this manual describes mainly the mechanism of conduction (pathways), its implications as obviously intended reach far into the study of neurology. It is, therefore, a precious book for the student of medicine and for the author who sets out to write on subjects involving the cerebrospinal and autonomous systems. The volume has 28 schemas interspersed with descriptive captions and a text appended for each. These give a full and wide understanding of a neglected subject, in a way the reader will appreciate. The figures on each of the special senses, respiration, circulation and the splanchnic organs are as refreshing to study as they are important in the practice of medicine. [*The Principal Nervous Pathways. By Andrew Theodore Rasmussen, Ph.D., Department of Anatomy, Medical School, University of Minnesota. Cloth. 74 pages, 11"x8". 28 figures. The Macmillan Co., New York, 1941. Price $2.50.*]

What Are Vitamins?

The science of nutrition has been so rapidly enriched through discoveries on the nature and functions of vitamins that a book of this title should not fail to excite considerable curiosity. It has a striking title, brevity and completeness to its credit. The author achieved the virtue of brevity by avoiding the redundance characteristic of books on this evolutionary study. He describes the properties and the functions of the vitamins as far as present knowledge permits. Many references are listed at the end of chapters, but the text is not choked with the flood of immature opinions contained in so many documentations of this subject, to the confusion of the reader.

To this author, the story of the vitamin began in 1911 when the Polish chemist, Casmir Funk, coined the misnomer "vitaamine," the word contracted first to "vitamine" and then "vitamin" to further hide the misleading etymon. ["Vitamin" is here to stay although its suffix "amin" must not be taken literally. Some vitamins have no nitrogen.]

One regrets that Christian Eijkman, actual father of the vitamin theory and Nobel prize winner for work in that field, is nowhere mentioned, not even in the author's several approaches to beriberi which some of us believe had something to do with the birth of the vitamin era. Dodging Eijkman in a thesis on beriberi or the B complex has the earmark of purposeful wiggling, since his observing mind was the womb and cradle of the vitamin.

In segregating the 13 chemically identified vitamins from the 17 postulated vitamins in an explanatory table, the author makes an excellent start in clearing up the whole subject.

Chapter II, entitled "What the Vitamins Do," is a classical treatment of cell respiration (metabolism) which the author links securely with the action of vitamins. Chapters IV through VIII, dealing with the sensational B complex, through the use of revealing chemical formulas and instructive tables, compress a vast amount of material of great value into a comparatively limited space.

Information of acknowledged value in animal medicine is contained in the chapters on vitamins C, D and E. This is especially true as to the chapter on vitamin C, which shows clearly that our views on this factor need revision. Obviously, our teachings regarding the antiscorbutic factors of food have been misleading. Of this the observing veterinary clinician has become severely aware in recent years. The part played by vitamin C in "cell respiration" can not be dismissed in the consideration of any somatic upset.

As to vitamin E, its distribution in foods of man and animals rather than its rôle in nutrition remains debatable. The belief that the intake is sufficient has been general, so much so that the Council on Pharmacy and Chemistry of the American Medical Association declines to allow claims of therapeutic benefits from this substance. Here, the author retorts that the adequacy of vitamin E in diets is by no means an

established fact. Reliable data on its distribution in food are meager.

The discussion of vitamin K, the hemorrhagic factor of Dam, and of vitamin P, associate of ascorbic acid in certain fruits (*e. g.*, paprika), though brief, will attract the veterinarian's attention to factors which may have considerable importance in animal nutrition.

Appendix A, twelve pages on the "Chemistry of Vitamins," is a useful reference of up-to-the-minute information on that detail, and appendix B is eight pages tabulating "Vitamin Values" of the various foodstuffs.

Veterinarians who wish to familiarize themselves with the latest knowledge on vitamins will appreciate this inexpensive book. It could hardly be too highly recommended as a modern treatise on a major subject in veterinary medicine. [*What Are the Vitamins? By Walter H. Eddy, Ph.D., director of Good Housekeeping Bureau and professor of physiological chemistry, Teachers College, Columbia University. Cloth. 247 pages. Reinhold Publishing Corporation, New York, 1941. Price $2.50.*]

More Meat for America

"More Meat for America" is the title of a pamphlet published by the American Meat Institute of Chicago, whose work supplements that of the National Live Stock and Meat Board. The text is a plea for putting meat in its rightful place in the diet, with the view of maintaining a healthy population.

The *per capita* consumption of meat dropped from 162 pounds to 131 pounds per annum from 1908 to 1939 and exports are greatly diminished. Americans now eat meat but 1⅓ times a day as compared with 3 times a day in years gone by. With the exception of a small rasher of bacon, breakfast is largely meatless and eating meatless lunches has become a common habit.

In view of the facts connected with the nutritive value of meat and its low cost, the trend should be reversed in the interest of all of the nation's population.

Laboratory Manual for Veterinary Bacteriology and Immunology

The authors divide this manual into two parts: (1) General Bacteriology and (2) Pathogenic Bacteriology and Immunology, and these into 52 exercises. The introduction contains a list of text books, general instructions for students, and apparatus required in college laboratory work.

The methods of teaching are those practiced at Iowa State College over a period of years and differ only in detail from those followed in other veterinary schools. A set of questions after each exercise summarizes the text to decided advantage and the blank pages interspersed furnish ample space for making notes. The brief remarks introducing each exercise and these sets of questions, being well chosen, are in fact quite a liberal education in bacteriology.

What at once catches the eye in reviewing this manual is that the authors do not hesitate to take the student headlong into the utilitarian side of microbiology, that is, into its clinical application forthwith.

Special culture media, stains and staining, glossary of descriptive terms, and reagents and tests used in identifying bacteria are briefly described in the appendix. [*Laboratory Manual for Veterinary Bacteriology and Immunology. By I. A. Merchant, D.V.M., Ph.D., associate professor of veterinary hygiene, Iowa State College, and A. G. Karlson, D.V.M., M.S., instructor of veterinary hygiene, Iowa State College. Sixty-eight 9" x 7" mimeographed pages. Paper. Burgess Publishing Company, Minneapolis, 1938. Price $1.75.*]

American wheat growers are told in a recent USDA release that if all the wheat we raise were made into bread, there would be 1,900 loaves a year for each family. The requirement is only 300 loaves per annum for the average family. And yet "they" say let the farmers do as they please in cropping the land.

The United States now manufactures 96 per cent of its dyes.—*Science News Letter.*

THE NEWS

AVMA Activities

Curtis and Lockhart Elected to Executive Board

As the result of recent elections, W. L. Curtis of Los Angeles, Calif., has been elected Executive Board member to represent District VI for a five-year term, and Ashe Lockhart of Kansas City, Mo., has been similarly honored in District VIII.

The elections were in progress from May 10 to July 10. On July 11, W. A. Young, F. A. Anderson and I. H. Velflick, all AVMA members residing in the vicinity of Chicago, served as tellers to count the ballots and certified the election results above reported.

Dr. Curtis succeeds I. E. Newsom, present chairman of the Board, in District VI and Dr. Lockhart succeeds L. J. Allen in District VIII. The new members will take office after the Indianapolis convention.

Seal of Approval Awarded to Ken-L-Biskit

Ken-L-Biskit, manufactured by Chappel Bros., Inc., of Rockford, Ill., has been awarded the seal of approval of the American Animal Hospital Association and the American Veterinary Medical Association.

At a meeting in Chicago, July 18, of the joint committee on foods of the AAHA-AVMA, the test data, recommendations of the Advisory Scientific Council and reports of individual veterinarians who conducted the feeding tests on dogs were reviewed and the decision was reached that the seal should be granted to Ken-L-Biskit.

Can You Help to Locate These Lost Members?

The aid of JOURNAL readers is solicited in locating the following members, mail to whom has been returned to the Association's central office. The last known address of each is given. Should you be able to provide information as to present residence, your advice *via* postcard or letter will be greatly appreciated.

[Through responses to an identical request published in this column last month, 80 per cent of our lost members have been located. Thanks for your help.—*Ed.*]

Belinsky, Joseph, General Delivery, West Union, W. Va.
Bjork, Clifford A., 1709 Opal St., Pullman, Wash.
Blake, W. P., 1225 14th Ave., Greely, Colo.
Blumenthal, Jacob Carl, General Delivery, Crookston, Minn.
Burns, Chas. G., Tallahassee, Fla.
Curry, Joseph M., 39 Hartland St., Hartford, Conn.
Decker, Lt. Clifford N., Fort Riley, Kan.
Harris, Frank T., 58 A Latona St., San Francisco, Calif.
Haworth, S. D., Pauls Valley, Okla.
Howarth, Carl R., Rt. 1, Box 24, Salem, Ore.
Klein, James E., Gainsville, Ga.
Lewis, Robert F., 1807 E. St., Pullman, Wash.
Mathis, Rudy C., State Veterinarian, Atlanta, Ga.
Maugel, J. P., 6100 N. Marshall St., Philadelphia, Pa.
Mitchell, James F., 528 Kirkman St., Lake Charles, La.
Noller, Richard, Mankato, Kan.
Palmer, Clarence R., Rt. 1, Box 195, Walnut Creek, Calif.
Rodgers, Robert J., Asheville, N. Car.
Rosenoff, Theodore D., 642 N. Oak St., Spokane, Wash.
Spring, Jacob E., 315 Ayres, Corpus Christi, Texas.
Thompson, J. C., State Department of Agriculture, Olympia, Wash.
Turner, C. W., Shasta Highway, Chico, Calif.
Wilmot, Clement E., Box 962, Eureka, Calif.

Plans Completed for Golf Tournament at Indianapolis

As announced in the official program of the 78th annual meeting, mailed to all Association members on July 25, the Indianapolis Country Club—one of the nation's finest courses—will be the scene of the veterinary golf tournament, Monday, August 11, at 1:00 p.m.

Wayne Alter, who is in charge of arrangements for the tournament, announces that teams representing several states will enter and he calls particular attention to the fact that individuals also are eligible and urged to play. Prizes will be awarded to teams and to individual players not affiliated with any team. Each entrant will pay his own greens fee, which is $1.50, entitling him to all privileges of the clubhouse. Players who have not already sent notice of their intention to compete are asked to do so at once. Communications should be addressed to Dr. Wayne C. Alter, St. Paul, Ind.

APPLICATIONS

First Listing*

ADAMS, GARLAND B.
Box 929, Vernon, Texas.
D.V.M., Texas A & M College, 1941.
Vouchers. H. Schmidt and H. L. Van Volkenberg.

ALLEN, CLIFFORD A.
1595 Forrest Ave., Memphis, Tenn.
V.M.D., University of Pennsylvania, 1941.
Vouchers: E. T. Booth and M. Jacob.

AMERINE, IVAN E.
Rt. No. 1, Canal Winchester, Ohio.
D.V.M., Ohio State University, 1941.
Vouchers: J. H. Knapp and W. F. Guard.

APPLEBY, AARON
P. O. Box 46, Blacksburg, Va.
D.V.M., Texas A & M College, 1941.
Vouchers: I. D. Wilson and E. P. Johnson.

ASCHER, MARGARET
310 W. 79th St., New York, N. Y.
D.V.M., Michigan State College, 1941.
Vouchers: C. F. Clark and B. J. Killham.

BABE, CARL R.
R.F.D. 1, Twin Oaks, Pa.
V.M.D., University of Pennsylvania, 1941.
Vouchers: M. A. Emmerson and A. Henry Craige, Jr.

BAILY, WILLIAM H.
105 E. Sickle St., Kennett Square, Pa.
V.M.D., University of Pennsylvania, 1941.
Vouchers: M. A. Emmerson and A. Henry Craige, Jr.

BARLOW, RUTH M.
823 Main St., Amherst, Mass.
V.M.D., University of Pennsylvania, 1941.
Vouchers: John B. Lentz and A. Henry Craige, Jr.

BARRY, ARTHUR A.
45 Campbell Ave., Revere, Mass.
D.V.M., Michigan State College, 1941.
Vouchers: C. F. Clark and B. J. Killham.

BAUMGARTEN, ARTHUR M.
88 Belmont Ave., Paterson, N. J.
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Vouchers: J. Payne Lowe and John H. Milliff.

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V.M.D., University of Pennsylvania, 1941.
Vouchers: M. A. Emmerson and A. Henry Craige, Jr.

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Vouchers: C. F. Clark and B. J. Killham.

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Vouchers: R. C. Dunn and H. Schmidt.

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Vouchers: R. C. Dunn and H. Schmidt.

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Vouchers: J. H. Knapp and W. F. Guard.

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Vouchers: C. C. Donelson and C. Harvey Smith.

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Vouchers: P. W. Burns and R. P. Marsteller.

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V.M.D., University of Pennsylvania, 1941.
Vouchers: E. T. Booth and A. Henry Craige, Jr.

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Vouchers: R. P. Marsteller and P. W. Burns.

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Vouchers: J. H. Knapp and W. F. Guard.

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Vouchers: J. G. Hardenbergh and A. Henry Craige, Jr.

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Vouchers: J. C. Flynn and C. M. Heth.

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Vouchers: M. A. Emmerson and A. Henry Craige, Jr.

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Vouchers: G. G. Bodine and A. Henry Craige, Jr.

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Vouchers: J. H. Knapp and W. F. Guard.

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*See July 1941 issue, p. 74.

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Vouchers: R. D. Turk and H. Schmidt.

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Vouchers: E. D. Leiby and W. H. Hendricks.

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Vouchers: J. H. Knapp and W. F. Guard.

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Vouchers: G. G. Bodine and A. Henry Craige, Jr.

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Vouchers: F. C. Tucker and Edgar D. Wright.

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B.V. Sc., Ontario Veterinary College, 1910.
Vouchers: J. C. Flynn and James S. Healy.

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Vouchers: C. C. Donelson and J. L. Axby.

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Vouchers: J. H. Knapp and W. F. Guard.

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Vouchers: C. F. Clark and B. J. Killham.

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Vouchers: R. C. Dunn and A. A. Lenert.

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Vouchers: John W. Mills and A. F. Schalk.

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Vouchers: W. F. Guard and J. H. Knapp.

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Vouchers: W. F. Guard and J. H. Knapp.

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Vouchers: C. L. Allen and A. Henry Craige, Jr.

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Connersville, Ind.
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Vouchers: J. L. Kixmiller and Frank H. Brown.

LARSON, KENNETH E.
Evansville, Minn.
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Vouchers: R. P. Marsteller and P. W. Burns.

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Vouchers: H. E. Redmond and R. P. Marsteller.

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Vouchers: W. F. Guard and J. H. Knapp.

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Vouchers: John D. Beck and A. Henry Craige, Jr.

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Vouchers: C. F. Clark and B. J. Killham.

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Vouchers: W. F. Guard and J. H. Knapp.

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Vouchers: Erwin F. Schroeder and A. Henry Craige, Jr.

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Vouchers: M. A. Emmerson and A. Henry Craige, Jr.

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Vouchers: R. P. Marsteller and P. W. Burns.

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Vouchers: E. S. Winters and F. P. Woolf.

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Vouchers: W. F. Guard and J. H. Knapp.

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Vouchers: C. F. Clark and B. J. Killham.

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Hiawatha, Utah.
D.V.M., Chicago Veterinary College, 1912.
Vouchers: E. D. Leiby and Carrel L. Jones.

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Vouchers: F. P. Woolf and E. S. Winters.

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Vouchers: Fay F. Russell and A. Henry Craige, Jr.

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Vouchers: M. A. Emmerson and A. Henry Craige, Jr.

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Vouchers: John H. Milliff and R. P. Marsteller.

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Vouchers: J. G. Hardenbergh and A. Henry Craige, Jr.

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Vouchers: C. F. Clark and B. J. Killham.

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Vouchers: E. S. Winters and F. P. Woolf.

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Vouchers: Jean C. Flint and E. D. Leiby.

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Vouchers: W. F. Guard and J. H. Knapp.

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Vouchers: B. Scott Fritz and A. Henry Craige, Jr.

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Vouchers: Carl L. Martin and A. Henry Craige, Jr.

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Vouchers: John H. Milliff and R. P. Marsteller.

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Vouchers: W. F. Guard and J. H. Knapp.

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Box 112, Shelby, N. Car.
D.V.M., Kansas State College, 1935.
Vouchers: A. A. Husman and J. H. Brown.

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1430 N. Capitol Ave., Indianapolis, Ind.
V.M.D., Indiana Veterinary College, 1909.
Vouchers: J. C. Schoenlaub and W. K. York.

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326 Sutherland Ave., Paris, Ill.
V.M.D., Indiana Veterinary College, 1908.
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Vouchers: Henry K. Copithorn and A. Henry Craige, Jr.

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Vouchers: W. F. Guard and J. H. Knapp.

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301 Seventh Ave. S. W., Rochester, Minn.
D.V.M., Iowa State College, 1937.
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D.V.M., Texas A & M College, 1941.
Vouchers: R. P. Marsteller and P. W. Burns.

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1000 No. Kimball Ave., Caldwell, Idaho.
D.V.M., State College of Washington, 1938.
Vouchers: J. L. Wilbur, Jr. and J. S. Bixby.

TWOHIG, JAMES D.
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D.V.M., State College of Washington, 1938.
Vouchers: Robert J. Foster and S. C. Dildine.

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1717 Lay Blvd., Kalamazoo, Mich.
D.V.M., Michigan State College, 1941.
Vouchers: Edw. K. Sales and B. V. Alfredson.

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D.V.M., Texas A & M College, 1941.
Vouchers: H. Schmidt and H. L. Van Volkenberg.

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Vouchers: R. A. Hendershott and J. R. Porteus.

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90 East Ave., Wellsboro, Pa.
V.M.D., University of Pennsylvania, 1941.
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D.V.M., Indiana Veterinary College, 1922.
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Vouchers: M. A. Emmerson and A. Henry Craige, Jr.

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M.D.C., Chicago Veterinary College, 1910.
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D.V.M., Texas A & M College, 1941.
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*Listed (July 1941 issue, p. 76) as a graduate of McKillip Veterinary College, class of 1941. The date should read "1911."

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U. S. GOVERNMENT

Conference on Swine Brucellosis

Since the discovery of the cause of infectious abortion by Bang, research has been primarily concerned with the infection in the bovine species. The existence in swine of a similar infection was first established in 1914 and the disclosure of the extension of the swine disease throughout the country, especially in the hog-raising belt, has definitely proved the economic importance of this disease. Nevertheless, the investigations in swine brucellosis were lagging, and as noteworthy progress has been made in the control of brucellosis in cattle, the apparent widespread distribution of the disease in swine necessitates closer application in the study of the infection in hogs.

Present methods of the control of the disease in swine, based primarily on the elimination or segregation of individuals reacting to the blood-agglutination test, have left much to be desired from the standpoint of adequate handling of the disease. This is particularly true in those areas where the incidence of infection is relatively high. In view of these facts, investigations designed to study the value of control measures, based on artificially induced active immunity, are of paramount importance. Furthermore, such studies need not be confined exclusively to these factors, as the critical study of other aspects of swine brucellosis is also of great importance.

With this in view, a conference was called in Chicago on July 21 by John R. Mohler, chief of the Bureau of Animal Industry, for the purpose of developing and assigning projects on swine brucellosis to various experiment stations most suitably located and equipped for that purpose. The participants included R. E. Buchanan and Charles Murray of Iowa; W. L. Boyd and H. C. H. Kernkamp of Minnesota; Ward Giltner and I. F. Huddleson of Michigan; W. V. Lambert and C. R. Donham of Indiana; J. R. Mohler, H. W. Schoening, H. C. McPhee, A. Eichhorn and C. K. Mingle of the Bureau of Animal Industry; and James T. Jardine, director of research, U. S. Department of Agriculture.

At the conference the projects to be studied were discussed with the view of determining the many factors which will make it possible to develop practical control measures for the suppression of the infection. Thus, aside from the Animal Disease Station, Beltsville, Md., where investigations on swine brucellosis have been in progress for the past year, exhaustive studies will be undertaken in coöperation with various experiment stations. It is confidently expected that these studies may be instrumental in making it possible to comprehend more fully the significant manifestations of the disease and to develop improved methods of diagnosis and control.

J. R. M.

Closer Supervision of Biologic Products

The distribution of viruses, serums and similar biologic products manufactured under federal licenses will be supervised more closely after January 1, 1942. Distributors, producers and importers will be required to keep permanent records concerning veterinary biologic products they handle along with details of the sources and methods of preparation, and tests of purity, of each batch when the product is to be shipped interstate.

The new requirement, designated as amendment 15 to BAI order 276, is a defense measure intended to control biologic products used in combating animal diseases and, thereby, safeguard the meat-food supply. It provides that no person shall ship, deliver for shipment, or transport any virus, serum, toxin, or analogous product consisting in whole or in part of live virus or live organisms unless the shipper at the same time forwards a notice to the Bureau of Animal Industry and to the proper livestock sanitary official in the area to which the shipment is consigned.

The general effect of the amendment is to surround the production and distribution of veterinary biologic products with even greater safeguards than in the past.

A Message on Defense from the Treasury Department

The Treasury Department has no hesitation in asking the coöperation of American veterinarians in the defense savings bond program. You who have given years of service in stamping out disease among animals understand the value of preventive medicine.

Today the nation has embarked upon a gigantic defense program to safeguard the health of our democracy and prevent the diseases of aggression and tyranny from coming to these shores. In this emergency, your skill and endurance will be needed more than ever.

But that is not all. In common with all other citizens of a free democracy, you are asked to share in the cost of the largest production plan

we have ever undertaken. We are producing not only guns and planes and battleships, but shoes and socks and blankets and food and houses with which to clothe, feed and shelter our fighting forces and house our defense workers. The American people are determined to remain free, and ready to pay whatever the price may be.

The Secretary of the Treasury has told us that he proposes to raise almost two thirds of the total budget by taxation and more than one third by borrowing. When millions must be raised by borrowing, why, you may ask, does the Treasury go to the people instead of choosing the quicker and far easier way of going to financial institutions such as banks and insurance companies. There are three reasons.

To begin with, defense savings bonds and stamps give every man, woman and child a chance to buy a share in America, to have a stake in this country's future. To quote Secretary Morgenthau, "I can think of no other single way in which so many people can become partners of their government in facing this emergency." This explains why the Treasury Department measures the success of the savings program not by the amount of money invested, but by the number of individuals who buy bonds and stamps regularly.

Defense bonds and stamps, moreover, help protect us against a rise in the cost of living. With wages going up sharply and employment at a new high level, there is danger that more money in the hands of millions of workers will start a spending spree, sending prices of commodities skyward. To prevent this, at least part of our larger earnings should be set aside regularly and invested in defense savings bonds and stamps. In this way the money goes back into the making of things for defense. Equally important, it is not used to buy articles which take away materials and skilled workers from defense industries.

Finally, these bonds and stamps help us to save for a rainy day. There is bound to be a difficult period of readjustment when the wheels of defense industries can safely be slowed down and our workers return to the arts of peace. Each of us has a duty to his country as well as to himself to make his own future more secure. Today the money we invest in bonds and stamps helps to pay for guns and planes; tomorrow it will be returned to us with interest, and will help us to buy a house or a college education.

The bonds offered to you are divided into three families called, for convenience, E, F and G. The E bonds are for the millions of small investors, or people who perhaps have never invested before, but who now want a share in national defense and have decided to put aside a part of their earnings, regularly and systematically. E bonds vary in cost from $18.75 to $750. They yield a 2.9 per cent return and mature in ten years. After 60 days they may be redeemed at any time. The F and G bonds are for corporations and people who have large sums to invest. The prices range from $74 to $10,000, and the rate of return is about 2½ per cent. They mature in twelve years.

The Treasury is relying upon members of voluntary organizations, such as the American Veterinary Medical Association and its constituent societies, to help educate and inform communities about the program. Of all the services citizens can render in this emergency, there is none more simple, direct or effective than the buying of defense savings bonds and stamps.—*Orville S. Poland, staff assistant to the Secretary of the Treasury.*

Army Veterinary Service

Regular Army.—Captain William E. Jennings is relieved from assignment and duty at the Front Royal Quartermaster Depot, Front Royal, Va., effective on or about August 26, 1941, and assigned to Fort Sill, Okla., for duty.

Lt. Colonel Seth C. Dildine is relieved from assignment and duty at Fort Lewis, Wash., effective on or about July 15, 1941, and assigned to the Chicago Quartermaster Depot, Chicago, Ill., for duty.

Lt. Colonel Solon B. Renshaw is relieved from assignment and duty at Fort George G. Wright, Wash., effective on or about July 10, 1941, and assigned to Fort Lewis, Wash., for duty.

Major Ralph W. Mohri is assigned to duty with the second cavalry division, Fort Riley, Kan., effective upon completion of his present tour of foreign service in the Panama Canal department.

Lt. Colonel Joseph H. Dornblaser is relieved from assignment and duty at Fort Bliss, Texas, effective on or about July 10, 1941, and assigned to the southwestern remount area, Colorado Springs, Colo., for duty.

Major Arvo T. Thompson is relieved from assignment and duty at March Field, Calif., effective on or about July 10, 1941, and assigned to headquarters, fourth air force, Riverside, Calif., for duty.

Major Ernest E. Hodgson is relieved from assignment and duty at headquarters, southwestern remount area, Colorado Springs, Colo., effective on or about July 15, 1941, and assigned to headquarters, third air force, Tampa, Fla. Prior to proceeding to Tampa he will proceed to the Chicago Quartermaster Depot, Chicago, Ill., for temporary duty for a period of approximately one month, for the purpose of pursuing a course of instruction.

Captain James B. Nichols is relieved from assignment and duty at the San Francisco Port of Embarkation, Fort Mason, Calif., effective on or about July 10, 1941, and assigned to headquarters, second air force, Fort George Wright, Wash., for duty.

Captain Richard G. Yule is relieved from assignment and duty at Fort Leavenworth, Kan., effective on or about July 10, 1941, and assigned to headquarters, first air force, Mitchell Field, N. Y., for duty.

Captain Wayne D. Shipley is relieved from assignment and duty as a student, University of Kentucky, Lexington, Ky., and from additional duty at headquarters, east central remount area, effective on or about August 15, 1941, and assigned to the Front Royal Quartermaster Depot, Front Royal, Va., for duty.

Lt. Colonel Raymond I. Lovell is relieved from assignment and duty at the Presidio of Monterey, Calif., effective on or about July 20, 1941, and assigned to Camp Forrest, Tenn., for duty.

Announcement is made of the promotion of Captain Harvie R. Ellis (major, Army of the United States) to the grade of major, with rank from June 24, 1941.

Announcement is made of the temporary promotion of the following named Veterinary Corps officers (from lieutenant colonel to colonel unless otherwise indicated, with date of rank indicated opposite their names:

Mott Ramsey, June 26, 1941.
Gerald W. FitzGerald, June 26, 1941.
Allen C. Wight, June 26, 1941.
Elwood L. Nye, June 26, 1941.
Chauncey E. Cook, June 26, 1941.

To Major: Captain Robert P. Kunnecke, retired, May 23, 1941.

Veterinary Corps Reserve.—First Lieut. Norman H. Stoner is relieved from assignment and duty at Fort Brady, Mich., and assigned to Selfridge Field, Mich., for duty.

First Lieut. Martin L. Tuttle is relieved from assignment and duty at Fort Hayes, Ohio, effective on or about June 25, 1941, and assigned to Fort Benning, Ga., for duty.

Special order relieving Captain Earl T. Martin from his present assignment and duty at Fort Ord, Calif., and assigning him to duty in the Hawaiian department is revoked.

Captain Alfred C. Zedlitz is relieved from assignment and duty at Fort Sam Houston, Texas, effective on or about July 10, 1941, and assigned to the Fort Worth branch of the San Antonio General Depot, Fort Worth, Texas.

Major John W. Burke is relieved from assignment and duty at the Medical Field Service School, Carlisle Barracks, Pa., effective on or about July 15, 1941, and assigned to duty at the Chicago Quartermaster Depot, Chicago, Ill.

First Lieut. Karl F. Steinbach is relived from assignment and duty at the Army Medical Center, Washington, D. C., effective on or about July 15, 1941, and assigned to the sixth corps area laboratory, Fort Sheridan, Ill., for duty.

First Lieut. Edward H. Von Glan is relieved from assignment and duty at Fort Lewis, Wash., and directed to proceed to San Francisco, Calif., and sail for the Hawaiian department for duty.

First Lieut. Benners B. Vail, Jr., is relieved from assignment and duty at Camp Shelby, Miss., effective upon completion of his present course of instruction at the Medical Field Service School, Carlisle Barracks, Pa., and will proceed to New York, N. Y., and sail on or about July 8, 1941, for the Panama Canal department for duty.

First Lieut. Ervin A. Eichhorn is relieved from assignment and duty at the Army Medical Center, Washington, D. C., effective on or about July 25, 1941, and assigned to headquarters,

first corps area, Boston, Mass., for duty with the first corps area laboratory.

Captain Richard E. Geisler is relieved from assignment and duty at Fort Douglas, Utah, effective on or about August 1, 1941, and assigned to headquarters, northwestern remount area, Salt Lake City, Utah, for duty.

First Lieut. Ernest St. J. Watkins is relieved from assignment and duty at Fort Douglas, Utah, effective on or about August 1, 1941, and assigned to Fort Douglas, Utah, for duty.

Each of the following-named officers of the Veterinary Corps is relieved from his present assignment and duty at the station indicated, effective on or about June 30, 1941, and assigned to the Kansas City Quartermaster Depot, Kansas City, Mo.:

Captain Arthur C. Jerstad, Fort George G. Meade, Md.

Captain Herbert F. Sibert, Fort Sill, Okla.

First Lieut. James I. Cornwell, Fort Bragg, N. Car.

First Lieut. Lester J. Gorman, Fort Myer, Va.

Announcement is made of the promotion of First Lieut. Edwin M. Crawford to the grade of captain, to date from June 18, 1941.

The following reserve officers were ordered to extended active duty by the War Department during the month of June and assigned to stations indicated:

First Lieut. Philip A. Lee, Mather Field, Calif.

First Lieut. Willard M. Van Sant, Air Corps Gunnery School, Boise, Idaho.

Major Colenzo H. Hoffmire, first armored division, Fort Knox, Ky.

The following officers of the Veterinary Corps Reserve (first lieutenants unless otherwise indicated), now on extended active duty at the stations indicated, have been ordered to report to the commanding officer, Chicago Quartermaster Depot, Chicago, Ill., for temporary duty for a period of 30 days for the purpose of pursuing a course of instruction, commencing on June 9, 1941, in the inspection of meat, meat-food and dairy products, under the depot veterinarian. Upon completion of this duty each of the officers indicated will return to his proper station:

James H. Gillespie, Air Base, Bangor, Maine.
Major Philip H. Fulstow, Pine Camp, N. Y.
Joseph J. Merenda, Fort Slocum, N. Y.
Charles B. Frank, Fort Myer, Va.
William A. Nusser, Fort Story, Va.
Aaron R. Griffith, Camp Davis, N. Car.
Russell S. Wann, Camp Croft, S. Car.
Bernard F. Mood, Camp Wheeler, Ga.
Philip C. Manly, Fort Knox, Ky.
Russell M. Madison, Chanute Field, Ill.
Ross H. Hurt, Camp Grant, Ill.
Dale R. Stephenson, Fort Custer, Mich.
John M. Dermody, Fort Francis E. Warren, Wyo.
Henry Loughridge, Fort Meade, S. Dak.
Charles R. Wainright, Brooks Field, Texas.
Charles E. Robinson, Lowry Field, Colo.
William B. Snodgrass, Fort Ord, Calif.
John L. McKitrick, Fort Hayes, Ohio.
George A. Leonard, Hamilton Field, Calif.

National Guard.—Major William A. Shannon, Camp Edwards, Mass., has been ordered to report to the commanding officer, Chicago Quartermaster Depot, Chicago, Ill., for temporary duty for a period of 30 days for the purpose of pursuing a course of instruction, commencing on June 9, 1941, in the inspection of meat, meat-food and dairy products, under the depot veterinarian. Upon completion of this temporary duty, Major Shannon will return to his proper station.

BAI Transfers

Charles Barnes from Pittsburgh, Pa., to Lyndonville, Vt., in charge of meat inspection.

Lowell R. Barnes from Indianapolis, Ind., to San Juan, Puerto Rico, on tuberculosis eradication.

Elmo Berroth from Mason City, Iowa, to Cedar Rapids, Iowa, in charge of meat inspection.

Henry J. Boyer from Manchester, N. H., to Dothan, Ala., in charge of meat inspection.

Meier Brodner from San Francisco, Calif., to Sioux City, Iowa, in charge of meat inspection.

James H. Coleman from Lyndonville, Vt., to Manchester, N. Y., in charge of meat inspection.

Maurice C. Duff from Charleston, W. Va., to Frankfort, Ky., on tuberculosis eradication.

George A. Franz from Dubuque, Iowa, to Indianapolis, Ind., in charge of meat inspection.

Keith R. Frick from Frankfort, Ky., to Lansing, Mich., on tuberculosis eradication.

Charles H. Herrold from Indianapolis, Ind., to Columbus, Ohio on virus-serum control.

George W. Hill from Chicago, Ill., to Wichita, Kan., on meat inspection.

David Jacobson from Albany, N. Y., to New York, N. Y., on meat inspection.

Edward Kernohan from Okmulgee, Okla., to Kansas City, Kan., on virus-serum control.

Fred O. Kieldsen from Cedar Rapids, Iowa, to San Francisco, Calif., in charge of meat inspection and field inspection.

C. Stuber Miller from Olympia, Wash., to Portland, Ore., on meat inspection.

Arthur L. Tellejohn from Pearl River, N. Y., to Omaha, Neb., on virus-serum control.

Mark H. Toroian from Portland, Ore., to Los Angeles, Calif., on meat inspection.

Wm. S. Trigg from St. Louis, Mo., to Richmond, Va., on meat inspection.

John R. Scott from South St. Paul, Minn., to Mason City, Iowa, in charge of meat inspection.

Otto W. Seher from Sioux City, Iowa, to St. Louis, Mo., in charge of meat inspection.

George H. Starr from Dothan, Ala., to Jacksonville, Fla., in charge of meat inspection.

George W. Winkler from Kansas City, Kan., to Dubuque, Iowa, in charge of meat inspection.

AMONG THE STATES

California

M. J. O'Rourke of San Francisco was elected president of the state association at the June meeting held in Hollywood. J. M. King of San Jose was elected secretary.

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Miss Jean McCallum of Stockton is a junior student of veterinary medicine at Michigan State College. She took that step, says the *Stockton Record*, when she lost two pets because there were no veterinarians available to care for them.

Colorado

Under the new Colorado state reorganization law effective July 1, 1941, Governor Ralph L. Carr appointed a new board of livestock inspection consisting of five members to replace the previous board of seven members. R. M. Gow was reappointed livestock sanitary commissioner. Paul Taussig, a prominent Hereford breeder and a graduate veterinarian, also is a member of the new board.

C. L. DAVIS.

Idaho

State Association.—One of the most successful meetings in the history of the state association was held at Burley, July 1-2.

Out-of-state contributors to the program, which was planned particularly for practitioners, were James Farquharson of Colorado, H. C. H. Kernkamp of Minnesota, and W. T. Huffman and Jean C. Flint of Utah. Clinics held on both afternoons of the session brought more animals for diagnosis and treatment than could be handled.

Tentative arrangements were made to hold a short business meeting in the summer of 1942, prior to the San Francisco convention of the AVMA, with a view to securing the full support of Idaho veterinarians in promoting the San Francisco event.

A. K. KUTTLER, *Resident Sec'y.*

Illinois

Veterinary Education at the State University.—The University of Illinois at Urbana has sent the following announcement "To Veterinarians, Farm and Home Advisers, Vocational Agricultural Teachers":

"Enclosed is a copy of the professional program of study in veterinary medicine this fall, September 1941.

"Some veterinary schools admit students who have completed one pre-veterinary year with a high academic average; others require two years of pre-veterinary training. The Illinois pre-veterinary program provides for both requirements, as well as the alternative in agriculture. This course has been so arranged that students who are not successful in gaining entrance to veterinary colleges in other states may continue in agriculture at Illinois and receive a B. S. degree.

"I shall appreciate if you will inform prospective students regarding the opportunity at Illinois."

S/ROBERT GRAHAM, *Head, Animal Pathology and Hygiene.*

The document goes on to say:

"The pre-veterinary program is designed to meet the needs of students desiring a broad foundation for a course in veterinary medicine. Upon completion of the first three years as prescribed below [the schedule of work for each semester of each of the four years is appended to the circular] the student is offered two alternatives. First, he may transfer to a recognized veterinary college, where he is required to spend four years obtaining the degree of Doctor of Veterinary Medicine. Admission to existing veterinary colleges is not assured by completion of either the three- or four-year course. The student who contemplates spending one or two years in professional training should consult and comply with pre-veterinary requirements of the school to be attended. Second, he may continue at this institution through the fourth year as prescribed above, at the successful completion of which he is eligible for the degree of Bachelor of Science in Agriculture."

Indiana

Northwestern Indiana Association.—Members of the Northwestern Indiana Veterinary Medical Association met at Glenn Ebright's hospital in Hammond, April 29, for a regular monthly clinic and dinner session, with C. L. Miller of Oak Park, Ill., as the presiding clinician. Among the guests were C. R. Donham of Purdue University and J. G. Hardenbergh and L. A. Merillat of the AVMA.

A feature of the meeting was the visit to the palatial medical building of Rush A. Kuhn, eye, ear and nose specialist of Hammond, whose staff entertained the members with a tour of inspection of the different departments, all of which are installed with the most modern equipment available for that branch of medicine.

The meeting adjourned for dinner at Phil

Schmidt's popular eating house skirting the shores of Lake Michigan, where the diners took bows at the call of Toastmaster Miller.

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Poultry-Disease School.—More than a score of practicing veterinarians in northeastern Indiana recently completed a ten-week course of poultry-disease instruction held under the auspices of the veterinary department of Purdue University, under the direction of C. R. Donham. Several Purdue staff members and F. C. Tucker served as the faculty. One evening a week for ten weeks was given over to the school, with the veterinarians driving from their homes to Columbia City for the lectures and laboratory sessions.

A similar school was held in Muncie and others will be held during the year at various points throughout the state.

Iowa

The annual meeting of the North Central Iowa association held in May at Fort Dodge drew an attendance of 175. M. I. Lichter of Burt was elected president; L. W. Schalk of Alden, vice-president, and H. C. Smith, secretary-treasurer.

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Under the headline "Spurious Veterinarian Pleads Guilty to Violation" the *Clinton* (Iowa) *Herald* reports that Wythal Davey was fined $100 (or 30 days in jail) for practicing veterinary medicine illegally. According to the charges Davey vaccinated 164 hogs near Clinton and 30 of them died. In lieu of the fine, the accused chose to serve out the 30-day sentence.

Louisiana

New Examining Board Appointed.—The new veterinary medical examining board appointed by Governor Sam Jones consists of M. H. Gandy of Baton Rouge, J. Arthur Goodwin of New Iberia, W. J. Gray of Thibadoux and J. D. Jones of Bastrop. On the afternoon of June 11, after the former board had given the annual examination, the new board met for an organization meeting at which J. D. Jones was elected president; M. H. Gandy, vice-president; J. Arthur Goodwin, secretary; and W. J. Gray, treasurer.

Maryland

State Association.—The Maryland State Veterinary Medical Association held its summer meeting in the auditorium of the Baltimore County Humane Society building in Pikesville, June 18-19, with approximately 90 members and guests in attendance The Ladies' Auxiliary convened at the same time and enjoyed shopping in Baltimore, a garden party in the afternoon of June 18 and dinner with their husbands.

The present status of Bang's disease work in Maryland was discussed by State Veterinarian Mark Welsh of College Park. L. L. Madsen of the Bureau of Nutrition at Beltsville then spoke on "Vitamins and Minerals in the Nutrition of Farm Animals."

A business meeting followed at which J. W. Spranklin of Baltimore was elected president; A. L. Brueckner of Silver Spring, first vice-president; Walter Hastings of Cambridge, second vice-president; and Mark Welsh of College Park, secretary-treasurer. John McClure of Hyattsville, J. E. Gilfillan of Galena, Walter Campbell of Bel-Air, J. W. Hughes of Elkton and M. H. Jacobs of Chestertown were elected to the Board of Directors.

An informal dinner, without speeches, in the auditorium of the humane society building closed the activities of the first day.

At the second session, J. A. S. Millar of Deal, N. J., spoke on the results of a comprehensive study he has made of tumors in dogs. The use of x-ray therapy and diagnosis was discussed by M. A. Emmerson of the University of Pennsylvania, Philadelphia, Pa. W. W. Dimock of the University of Kentucky, Lexington, Ky., spoke on "Sterility and Diseases of Mares and Foals." Angus McLean of Johns Hopkins Hospital at Baltimore demonstrated the removal of a cataract from the eye of a dog and William Reinhoff of the same institution demonstrated chest surgery in dogs.

A. L. Brueckner of Silver Spring was elected delegate and Mark Welsh, alternate, to the House of Representatives of the national association.

MARK WELSH, *Secretary.*

Michigan

State Association.—The 59th annual meeting of the Michigan State Veterinary Medical Association was held in the new veterinary clinic building of Michigan State College, East Lansing, June 17-18.

Clinics and a banquet occupied the first day, and literary and business sessions the second. B. J. Killham, of East Lansing, extension veterinarian, gave a paper on "Newer Developments in Mineral Deficiencies" in which the use of cobalt in certain sandy areas of Michigan was mentioned. Byron P. Merrick of Berlin Heights, Ohio, spoke on "Canine Practice and Hospitalization in a Rural Community. Christian G. Jensen of Petoskey followed with a paper on "Building a Practice in a Rural Community." Concluding, E. S. Weisner of East Lansing, extension poultry specialist, spoke on "Poultry Practice as Related to National Defense."

F. D. Egan of Detroit was elected to the Board of Directors for a six-year term and the

POULTRY SCHOOL SPONSORED BY PURDUE UNIVERSITY

At a poultry school held recently in Columbia, Ind.—one of a ten-week series sponsored by the veterinary department of Purdue University at Lafayette—the following veterinarians were in attendance (front row, left to right): W. S. Weigle, H. M. Bonifield, C. W. Striggle, D. D. Baker, George L. Clark, Jay B. Current, H. W. Demsey and H. Holm; (back row, left to right): H. Hostetter, J. P. Ryan, S. M. Friedley, C. E. Haflich, N. A. Turner, Noble Neff, Geo. O. Smith and Geo. E. Keith; (front, center): F. C. Tucker. (Story on page 172.)

SMALL ANIMAL CLINIC AT GLENN EBRIGHT'S HOSPITAL

Members of the Northwestern Indiana Veterinary Medical Association met at the small animal hospital of Glenn Ebright in Hammond, April 29, for a monthly clinic and dinner session. (Story on page 171.)

following men were elected to office for the ensuing year: G. D. McIntyre of North Branch, president; L. H. La Fond of Detroit, first vice-president; S. G. Colby of Monroe, second vice-president; C. F. Clark of East Lansing, third vice-president; and E. C. W. Schubel of Blissfield, secretary-treasurer.

E. C. W. SCHUBEL, *Secretary.*

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The Michigan-Ohio Association.—The annual meeting of the Michigan-Ohio Veterinary Medical Association was held at the offices of Schubel and Schwabland in Blissfield, May 22.

A large animal clinic was held in the afternoon, out in the open under conditions comparable to those of general practice. A mare suffering from nymphomania, three cryptorchid horses, and a case of hydrocele in a gelding were the main subjects. The surgeons were E. M. and Don De Tray and J. L. Boydson. The animals were all anesthetized with chloral.

The attendance was 65. The officers elected were: E. S. White of Onsted, president; Don De Tray of Napoleon, Ohio, vice-president; and J. L. Boydson, secretary-treasurer, vice E. C. W. Schubel, who retired after holding that office for 12 years.

North Carolina

State Association.—The North Carolina state association held its 40th annual meeting at Wrightsville Beach, June 26-27, with over 100 veterinarians and their wives in attendance. The state examining board convened on June 25 and examined 16 applicants.

Chas. C. Rife of Atlanta, Ga., spoke on practical procedures in a veterinary hospital; A. H. Quin of Fort Dodge Laboratories, Inc., Des Moines, Iowa, on swine diseases; A. C. Merrick of Brookfield, Ill., on problems in everyday practice; M. M. Leonard of Asheville on the veterinarians' responsibility under the 1941 livestock market law; and J. P. Mauney of Asheville on mastitis control. A motion picture, entitled "Blood Transfusion of Large and Small Animals," was shown by L. A. Mosher of Atlanta, Ga., through the courtesy of Cutter Laboratories, Berkeley, Calif.

Clinics supervised by Drs. Rife and Merrick occupied the second day.

At its business session the Association elected B. H. Staton of Rocky Mount president; N. B. Tyler of Raleigh, first vice-president; J. P. Mauney of Asheville, second vice-president; J. H. Brown of Tarboro, secretary-treasurer; and A. A. Husman of Raleigh and J. I. Neal of Southern Pines, directors.

J. H. Brown was nominated to serve another five-year term on the examining board. A. A. Husman and J. H. Brown were reëlected delegate and alternate, respectively, to the House of Representatives of the national association.

J. H. BROWN, *Secretary.*

North Dakota

June 16-17, the North Dakota Veterinary Medical Association convened for its 37th annual session in Fargo, where the following program was presented:

"Reasons for Some of Our Mistaken Diagnoses," C. H. Covault, Iowa State College, Ames, Iowa.

"Inguinal Hernia of Stallions," R. E. Shigley, Minot.

"Shipping Fever of Cattle," I. O. Barrington, Union Stock Yards, South St. Paul, Minn.

"Nonspecific Intestinal Infections," Casper I. Nelson, North Dakota Agricultural College, Fargo.

"Vitamins and Minerals for Livestock," F. W. Christianson, North Dakota Agricultural College.

"Argentina," H. L. Walster, dean of agriculture, North Dakota Agricultural College.

"Swine Diseases," H. C. H. Kernkamp, University Farm, St. Paul, Minn.

"Artificial Insemination of Cattle," C. H. Hofstrand, Leeds.

Officers were elected as follows: M. C. Hawn, president; R. S. Long, vice-president; and Sidney Bjornson, secretary-treasurer.

M. C. HAWN.

New York

The horse pulling contest at the state fair at Syracuse, August 25-29, is designated the National Horse Pulling Contest for 1941. Entries are in two classes: teams under 3,000 lb. and teams 3,000 lb. and up. Cash premiums aggregating $2,000 are to be divided equally between the two classes.

Oklahoma

State Association.—The Oklahoma Veterinary Medical Association convened at Stillwater, June 11-12.

The program, arranged by the veterinary department of Oklahoma A & M College, included a talk on "The Poultry Industry in Oklahoma" by T. T. Milby of the College's poultry department; two papers on swine diseases by H. E. Biester of Iowa State College, Ames, Iowa; "The Veterinarian in Poultry Practice" and "Anatomy and Physiology of Poultry" by F. C. Tucker of Claypool, Ind.

Swine and poultry clinics on the second day were presented by Drs. Biester and Tucker, respectively.

A program for the Ladies' Auxiliary, arranged by the ladies' committee on local arrangements, was staged by members of the College faculty.

F. Y. S. MOORE, *Secretary.*

Oregon

Oregonian Praises the Veterinarians.—A full column editorial in the *Oregonian* (Portland)

entitled "The Veterinarian's Work Day" is a fine tribute to the veterinary profession. It was inspired by a letter from V. C. Pauhlman, intrepid worker for good things in veterinary medicine, who must have given the editor quite an earful about what a veterinary doctor does all day now that the horse and buggy is in the limbo and lives as a reality only in the memory of the three-score-and-tenners. It speaks of the expansion of veterinary knowledge along with that of better livestock and a corresponding broadening of responsibilities and does not forget to tell how lucky sick animals are to have doctors capable of spotting ills without the aid of vocal information. Then there is the rain, the sleet, the cold, the heat and the long hours to negotiate in behalf of the ailing herd, not to mention the scope of scientific knowledge the animal doctor fetches along. We quote: "They're fine fellows, all of them —earnest, sincere, competent. You can't say enough about them. Reflectively we agree to this; for we haven't."

Texas

Sleeping Sickness.—The death of two persons from sleeping sickness in the Brownsville region is being discussed in connection with the presence of encephalitis in livestock. Veterinary Inspector Darby, press reports say, has conferred with public health officers to discuss the relations of these two cases to the 70 or more cases of equine encephalomyelitis in that district.

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The Houston Association.—The "standing room only" sign posted at the final spring-summer meeting, May 1, is the evidence of the interest being shown in this local society. The attendance was made up mainly of practitioners of Houston, Galveston, Angleton, and proximate areas.

The attendance at these monthly meetings testifies to the distinction and interest of the programs, to the high standing of the speakers, and the character of the subjects chosen. This meeting, for example, was featured by an address by our popular and beloved Hubert Schmidt, head of veterinary activities at the state experiment station. The address entitled "Phenothiazine" brought out a barrage of questions on the virtues and indiosyncrasies of that drug. The talk was closed by an appeal from Dr. Schmidt for the support of the AVMA because of its high moral and intellectual excellence.

J. J. Reid of the Angleton experiment station described a simple test for detecting the minutest amounts of arsenic in suspected material. Dr. Reid's associates, Paul C. Piercy and C. A. Woodhouse, participated.

D. C. Frederick's paper on canine leptospirosis aroused a great deal of interest. Veterinarians of the Gulf Coast region are detecting cases of this disease which may have been overlooked in the past or passed off as pellagra.

President Emmett E. Keigan, besides introducing the speakers, described the surgical technic for excising "ties" in show cattle, a practice that is being overlooked by the average practitioner.

Other speakers were H. L. Van Volkenberg, professor of parasitology, Texas A & M College; Richard Turk, of the state experiment station; John Milliff, pathologist and bacteriologist, Texas A & M College; J. J. West, associate professor of veterinary practice, Texas A & M College; H. H. Payne, El Cambo practitioner, and others.

The Association honored Captains Fred Burkey, T. A. Ward and Jack O. Whitehead, members of the Houston Veterinary Medical Association now in active military service, by citations and gifts commending their sacrifice in behalf of national defense.

F. S. Molt (Ind. '12), associate of W. T. Hufnall in small animal practice, was elected to the membership.

Quoting from Secretary Hufnall's report: "Time for adjournment failed to interrupt this fireside gathering until 'lights out' broke up the spell, and all departed with a greater friendship for his brother in practice and better prepared to serve."

Wisconsin

State Association.—The 26th semiannual meeting of the state association was held at Chippewa Falls, June 26-27.

The meeting consisted mainly of a clinic held at the fair grounds Thursday afternoon through Friday. Walter Wisnicky, J. S. Healy and T. H. Ferguson and B. A. Beach figured actively in the two-day program. The clinic was outstanding in respect to the variety of subjects, adequate and sanitary equipment and skillful, humane surgical work. Among the operators from out of the state were Carl F. Schlotthauer of the Mayo Clinic, Rochester, Minn., and J. C. Flynn, small animal surgeon of Kansas City, Mo.

President Finkle, J. B. Collins, local practitioner, and John R. Berggren of Baldwin must be credited with planning and carrying out a smooth-running session. Mrs. George Theiler's vocal renditions and leading of the group singing coupled with Healy's inimitable technic at toastmastering were noteworthy factors of the meeting. Editor L. A. Merillat of the JOURNAL was presented with a desk set, with the citation "A token of friendship from Wisconsin veterinarians."

COMING MEETINGS

St. Louis District Veterinary Medical Association. 7800 Olive St. Road, St. Louis, Mo. August 1, 1941. J. P. Torrey, secretary, 555 N. 14th St., East St. Louis, Ill.

Small Animal Hospital Association. Los Angeles, Calif. August 5, 1941. W. K. Riddell, secretary, 3233 W. Florence Ave., Los Angeles, Calif.

Dallas-Fort Worth Veterinary Medical Society. Dallas, Texas. August 7, 1941. Frank Brundrett, secretary, 1809 Atwood, Route 2, Dallas, Texas.

American Veterinary Medical Association. Murat Theatre and Shrine Temple, Indianapolis, Ind. August 11-15, 1941. J. G. Hardenbergh, executive secretary, 600 S. Michigan Ave., Chicago, Ill.

Kansas City Veterinary Medical Association. Kansas City, Mo. August 18, 1941. Glen L. Dunlap, secretary, 800 Woodswether Road, Kansas City, Mo.

San Diego County Veterinary Medical Association. Zoölogical Research Bldg., Balboa Park, San Diego, Calif. August 18, 1941. Paul D. DeLay, secretary, State Poultry Pathological Laboratory, Balboa Park, San Diego, Calif.

Southern California Veterinary Medical Association. Chamber of Commerce Bldg., Los Angeles, Calif. August 20, 1941. Charles Eastman, secretary, 725 S. Vancouver Ave., Los Angeles, Calif.

PERSONAL NOTES

Births

To Dr. (Iowa '31) and Mrs. W. T. Oglesby of University, La., a daughter, Willadene Francis, May 25, 1941.

To Dr. (Wash. '40) and Mrs. M. H. Dubin of Yuba City, Calif., a daughter, Kathy Jean, June 20, 1941.

To Dr. (Corn. '39) and Mrs. (Corn. '39) John L. Halloran, Jr., a son, John Lewis III, July 14, 1941.

Marriage

David E. Gibbs (A.P.I. '39) of Indianapolis, Ind., to Ann Williams of Cincinnati, Ohio, at Cincinnati, June 18, 1941.

Activities

Raymond D. Read (Iowa '41) has located for practice at Ranon, Lake county, Mont., and has been appointed a deputy state veterinarian.

Seymour Notarius (Mich. '39), formerly of Chicago, Ill., has taken over the practice of the late H. C. Stamen in New Rochelle, N. Y.

Ross Paige (St. Jos. '21), formerly with the U. S. Bureau of Animal Industry with station in Louisiana, has located for general practice at Alexandria, La.

W. C. Schofield (O.S.U. '36) of the Louisiana State University, University, La., was a guest speaker at the recent annual meetings of the Louisiana Poultry Improvement Association and the Mississippi Poultry Improvement Association.

C. L. Martin (O.S.U. '28), who for the past twelve years has been head of the poultry pathology laboratory of the New Hampshire Agricultural Experiment Station at Durham, N. H., resigned July 1, 1941, to enter private practice at Rochester, N. H.

Chester H. Kennedy (K.S.C. '40), formerly of Parsons, Kan., has been appointed to the staff of the division of animal industry of the Nevada state department of agriculture, with station at Elko, Nev., succeeding T. H. Leenerts (Colo. '41), who has been called into army service at Fort George Wright, Spokane, Wash.

DEATHS

Joseph N. Holzer of Minneapolis, Minn., an employé of the U. S. Bureau of Animal Industry since 1913, died on July 1, 1941.

Born December 8, 1890, at Lincoln, Neb., Dr. Holzer was graduated from the U. S. College of Veterinary Surgeons in 1912. He joined the AVMA in 1917.

John H. A. Anderson of Monticello, Ind., died on May 29, 1941.

Born in Carroll county, Ind., October 27, 1885, Dr. Anderson was graduated from the Terre Haute Veterinary College in 1913. He was a member of the AVMA from 1924 to 1932, and rejoined in 1940.

S. S. Gibson of Legion, Texas, died on April 14, 1941.

Born at Andrew, Iowa, June 15, 1888, Dr. Gibson was graduated from the McKillip Veterinary College in 1917. He joined the national association in 1937.

Lewis C. Crabb of Fort Worth, Texas, died on March 29, 1941.

Born at Celeste, Texas, February 12, 1889, Dr. Crabb was graduated from the Kansas City Veterinary College in 1911. He joined the national association in 1916.

James F. Carey of Lambertville, N. J., died on May 23, 1941.

Born at Brooklyn, N. Y., July 10, 1872, Dr. Carey was graduated from the New York-American Veterinary College in 1907.

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Lenigallol, applied locally, will clear up many of even the most persistent skin conditions and their associated low-grade infections. Lenigallol mildly cauterizes the diseased area, checks itching and stimulates the growth of new, healthy skin.

Lenigallol is used on the skin as a 6% ointment, such as Lenigallol (zinc) Ointment, or as a saturated (3%) acetone solution. In the ear, use an ointment or dust in a mixture of 10 parts Lenigallol powder and 90 parts boric acid or kaolin.

BILHUBER-KNOLL CORP. ORANGE, NEW JERSEY

Nitro-Hyposol

SOLUTION

For hydrocyanic acid poisoning.

6-250 cc . . . $3.00

TABLETS

For toxemia incident to colic, and alimentary stasis.

6-100s $9.45

Curts-Folse Laboratories

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Kansas City, Kansas

An' Related Topics

Equine Refugees

A pair of Clydesdale geldings purchased in Scotland by Wilson & Company, Chicago packers, to improve their famous six-horse hitch and horse-show exhibit, had an eventful passage across the Atlantic. Their first ship limped back to dry dock after being torpedoed in midocean and the second, no less ill-fated, had to return to port for repairs after fighting a U-boat. Pursuant to a third start, the pair finally landed in New Brunswick whence they were freighted to their sumptuous *étalage* in Chicago. The log showed eight months out of Glasgow, condition excellent, freight bill $2,000.

Food in Human Welfare

Food is becoming a main topic of current interest for the first time in the United States since the War Between the States, which inspired the veterinarians of the 1860s to form a national association, the present AVMA.

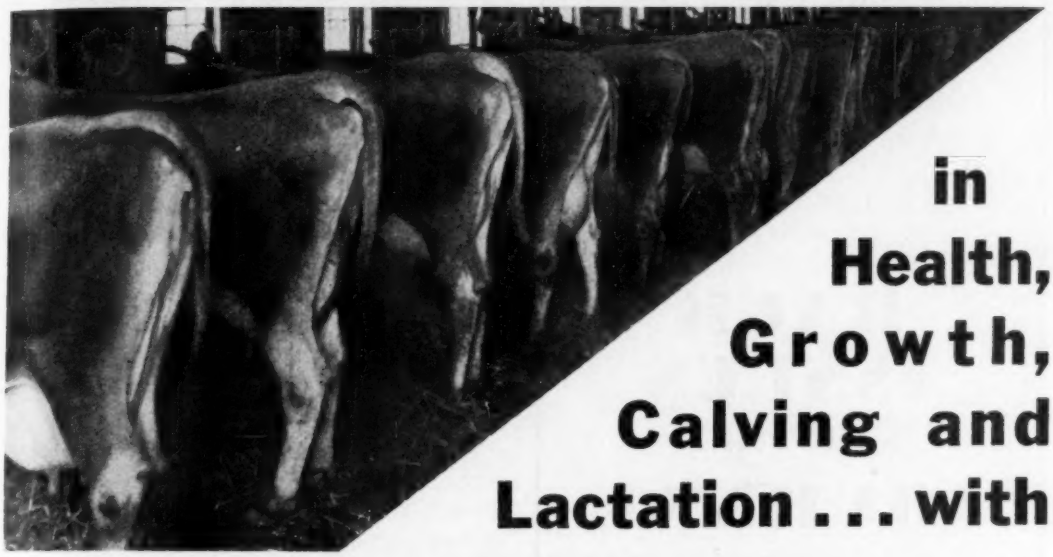
Articles in newspapers and magazines on food supply in different parts of the world have been too numerous to name. The press department of the National Broadcasting Company, as of July 1, alone lists the following radio talks on the subject of food:

Food to Grow on
Good Nutrition for Mother and Child
Rural People Build for Better Nutrition
Food Needs for Men and Industry
Food Needs for Women
Knowledge of Human Nutrition
Diets in Total National Defense

That the food supply needed to ward off malnutrition, emaciation and starvation can no longer be regarded as safely ample for large industrial populations and armies where production is interrupted, has become an important issue. The real facts about foods are being deeply impressed upon the scientific minds everywhere, even in this country where publicity given to surpluses has created an erroneous idea as

(*Continued on page xxii*)

TOP NOTCH UNIFORMITY



in Health, Growth, Calving and Lactation ... with

Calcium
Phosphorus

VIAMINERAL

Iodine
Yeast

IN THIS DAILY RATION for DAIRY CATTLE

With Straight Legume Roughage
(Cowpeas, soybeans, alfalfa or clover)

*	1400 lbs.	ground corn
**	400 lbs.	wheat bran
***	100 lbs.	O. P. linseed oil meal 34%
***	100 lbs.	cottonseed meal 43%
	30 lbs.	VIAMINERAL
	20 lbs.	common salt
	2050 lbs.	

AVERAGE ANALYSIS

Crude Protein	13.7%
Fiber	4.4%
Fat	4.4%
N. F. E.	63.0%

Grind to medium fineness. Jersey and Guernsey cows—1 lb. for each 3 lbs. milk. Holstein or Shorthorn cows—1 lb. for each 4 lbs. milk.

* 50% of corn may be substituted with ground wheat.

* Substitutes for corn pound for pound—corn and cob meal, ground barley, ground kaffir or milo, hominy feed.

** Substitutes for wheat bran pound for pound—ground oats, alfalfa meal, wheat middlings.

*** Substitutes for linseed oil meal and cottonseed meal pound for pound—gluten meal 35%, soybean oil meal 43%, crushed soybeans.

VIAMINERAL is a supplemental FEED—not a medicine. Available ONLY through veterinarians. Write today for literature and prices.

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April 1940
January 1941
April 1941

Must be in good condition

AMERICAN VETERINARY MEDICAL ASSOCIATION, 600 S. Michigan Ave., CHICAGO

An' Related Topics

(*Continued from page xx*)

to the amount of food that would be available for our 130 million if and when animal production is dislocated by mishandling of its intricate machinery.

The (In)Human Race of '41

Not long ago, in fact within the memory of middle-aged men, commanders of invading forces on land or sea warned the civilian population to flee beyond the range of their guns before opening fire. Gallantry had not perished from the earth, and decorations were not won by strewing the streets with the blood and mangled remains of helpless children.

But this is *anno domini* 1941, not yesterday. The plantigrade known as the genus Homo, sp. sapiens Linnaeus, has slipped downward on the scale of moral conduct. So, you makers of a great nation, govern yourselves accordingly.

Quelle Chute (= What a Fall)

It seems to be the general opinion that horse-drawn military units and horse cavalry are obsolete in the modern army.

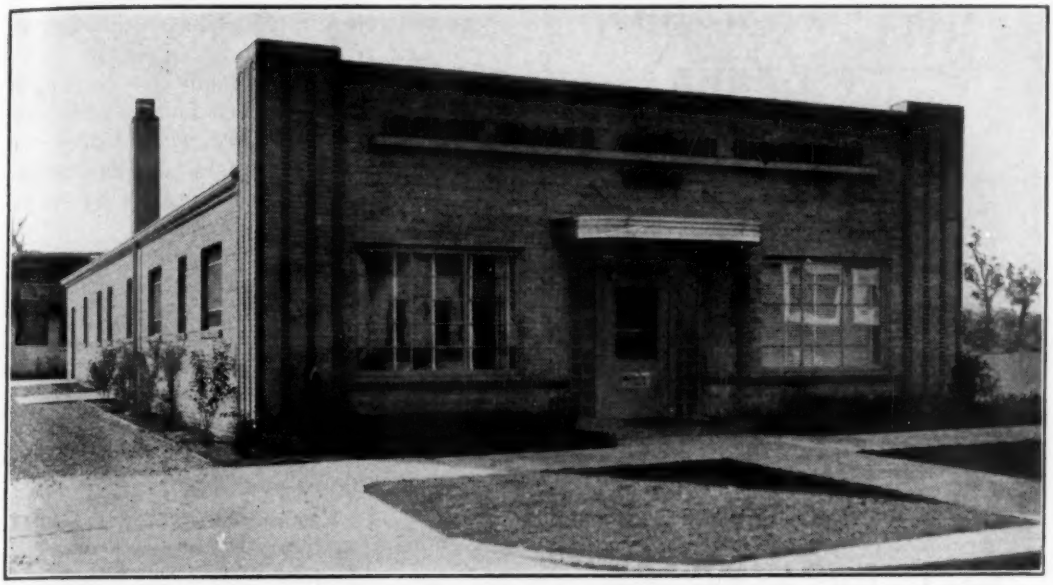
Unfortunately for me, I can vouch to the contrary, having been caught in the German invasion of southwestern France where I had made my home since the end of the first World War.

In this part of France, between Bordeaux and the Spanish border, the first invading troops were motorized. These were followed by cavalry, horse-drawn artillery supply and Red Cross trains. Red Cross

(*Continued on page xxiv*)

IN CANKER
OTORRHEA
EAR MITES
VETERINARY *Auralgan*
Veterinary Division THE DOHO CHEMICAL CORPORATION NEW YORK - MONTREAL - LONDON

St. Paul's New Veterinary Hospital Selects G-E Model F-3 X-Ray Unit



Dr. A. A. Feist's Small Animal Hospital, 1430 Marshall Ave., St. Paul, Minn., provides accommodations for 85 patients. Modern in every respect, its facilities for diagnosis and treatment include a G-E Model F-3 X-Ray Unit.

● Its wide acceptance by leading small animal hospitals is adequate proof that the G-E Model F-3 X-Ray Unit is an ideal, all-round x-ray apparatus for the modern veterinary institution. Used in conjunction with the Model 35 tube stand, the F-3 provides full flexibility and complete mobility for use in the surgery or examining room. When removed from the tube stand and packed in its neat, compact carrying case, it is ready for field use.

There is considerable evidence, too, that the addition of an F-3 unit to your diagnostic facilities will prove a sound investment because it will materially increase the value of your services; and giving better service, doing better work, results, as a rule, in both increased clientele and income.

The satisfactory experience of your colleagues is an excellent guide in selecting your x-ray apparatus. Why not do as they did—discuss the Model F-3 with your local G-E X-Ray representative. He will give you full information about the unit's moderate price and the convenient payment plan which can be arranged to fit your budget; he will arrange an interesting demonstration, too, if you wish.

To request his visit, or your copy of the big, illustrated catalog which describes G-E X-Ray and Electromedical apparatus for veterinary surgeons, just fill in and mail the convenient coupon, today.

---CLIP, SIGN, and MAIL, TODAY!---

☐ Please have your local representative arrange with me for an F-3 demonstration, at my convenience, when he is next in this vicinity.

☐ Please send me my copy of the big illustrated catalog that describes G-E X-Ray and Electromedical apparatus for veterinary surgeons.

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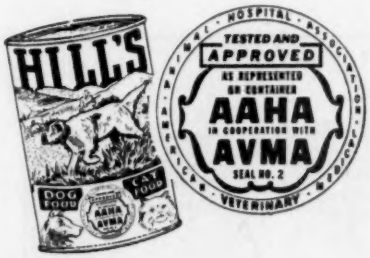

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Graduate Courses in Pathology and Bacteriology (including immunology) extending through one session.

For Catalogue and further information, address

GEORGE ALEXANDER DICK,
Dean, Veterinary Faculty

An' Related Topics

(*Continued from page xxii*)

units were so numerous that I had doubts as to their real use.

The presence of so many horses was a real burden to the French farmer and peasant. His hay fields were requisitioned for grazing, and in many cases the German authorities had no regard for growing crops. Low-lying fields were ruined.

Good veterinary service was very much in evidence, so much so that it made one wonder why the Germans have such strange ideas in regard to their fellowmen in contrast to their human understanding of man's friend.—*E. M. Rundhal.*

Dogs in England

Rumors to the effect that dogs have been practically eliminated in England are obviously exaggerated. From *The Veterinary Record* of May 3 we quote: "Because of the extreme difficulty in providing dogs with meat from the table, hundreds of dog-foodshops have sprung up in various parts of the country, many of them selling cow meat colored green to show that it is not fit for human consumption." "Hundreds of dog-foodshops" would not spring up if there were no dogs.

Quick-Frozen Food: Meat, Fish, Vegetables, Fruit

The freezing of food, when "harvested," as a means of preserving freshness, flavor and quality, a relatively new departure in the art of human subsistence, brings another study into the scope of veterinary medicine. Granted that expertness in food inspection is best acquired through the veterinary curriculum, quick freezing of food should not be overlooked in our studies, particularly by those in the military service where authority over food inspection extends over a wider range of foodstuffs than that of any other public service.

The future appraisal of the veterinary profession as the people's food-inspecting

(*Continued on page xxvi*)

Favorable Prognosis— *with* Confidence

VETERINARIANS have brought added prestige to their profession through the use of the Canex treatment. Dogs once doomed to destruction because of follicular mange now have excellent chances for recovery. Reports of effective Canex therapy from 34 veterinarians showed 128 complete recoveries in 132 cases. This extensive clinical background has definitely established the effectiveness of the Canex treatment.

Canex is available from licensed Veterinary supply houses.

OUTSTANDING ADVANTAGES OF CANEX TREATMENT

Uniform results
Simplicity and safety of treatment
Rapidity of recovery
Reduced number of applications
Quick growth of hair on treated areas

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Books and Magazines

DOG SENTIMENT CARDS for office wall, set of 12, 60 cents. Judy's *Dog Encyclopedia*, all dog subjects, $5. *Dog World* monthly, $2 for one year; $3 for 2 years; $5 for 5 years. JUDY PUBLISHING COMPANY, 3323 Michigan Blvd., Chicago, Ill.

For Sale

PRACTICES, locations and partnerships furnished and sold—all states. F. V. Kniest, 1537 S. 29th St., Omaha, Neb.

WILL SELL large practice and lease small animal hospital. Good deal for right man. Owner wants to retire. Address: Dr. C. T. Norman, 2965 N. E. Sandy Blvd., Portland, Ore.

Wanted

A LARGE feed manufacturer requires the services of a graduate veterinarian experienced in treating diseases of poultry, cattle and small animals. Position involves speaking before sales and consumer groups and writing for publication. Excellent opportunity. Age between 30 and 40 preferred. Reply to P. O. Box 1908, Seattle, Wash., giving full details.

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Cattle, Sheep and Hogs

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DOG FOOD

Tested and Approved

WRITE FOR SAMPLE

KENNEL FOOD SUPPLY CO., INC.
Fairfield, Conn. AVMA 8/41

An' Related Topics

(*Continued from page xxiv*)

agency will depend not only upon our knowledge of stereotyped meat inspection, but also upon that of the novelties which come along through the development of science and invention. The quick freezing of food is one of these novelties which superimpose new responsibilities upon the food inspector. The quick freezing of food is wide open for unethical practices that may flood the market with inferior food. Freezing does not improve the spoilage nor any property food has lost, and since the process of freezing, especially the speed of freezing, has an important bearing upon the quality of the finished product when served, the technics of frozen-food production become a part of the veterinarian's training, as much so as the art of milking cows.

News from the battlefields of Europe shows that frozen foods (duly credited to American inventions) are an important part of the military commissariats.

Pup Pays Up

After spending a hectic half hour looking for her purse, Mrs. G. C. Tesch of Santa Barbara, Calif., discovered that her 2-year-old pup had eaten $91 in bills. When found, the pup was chewing peacefully on the last $20 greenback. "The housewife," says the *Santa Barbara News Press*, "lost no time in rushing pooch to Veterinarian Chauncey E. Miller who retrieved three more 20's, a ten and a one dollar bill." *Modus operandi* and sequel not mentioned.

Collecting data is like collecting garbage. After you have it you have to do something with it.—*Will Rogers.*

A Clydesdale gelding auctioned in Glasgow in the aid to an air raid distress fund, brought 650 pounds, or about $3,000.—*Veterinary Record.*

(*Continued on page xxviii*)

OFFICIAL DIRECTORY OF Approved Foods

CERO-MEATO (Dry)
Kennel Food Supply Co., Fairfield, Conn.

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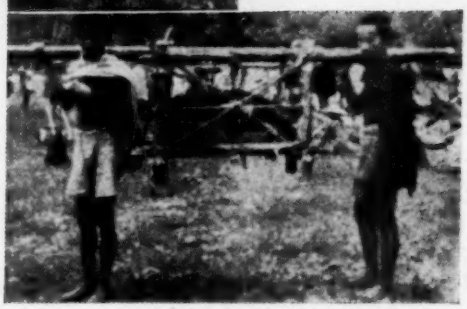
Committee on Foods

AMERICAN ANIMAL HOSPITAL ASSOCIATION
in cooperation with
AMERICAN VETERINARY MEDICAL ASSOCIATION

An' Related Topics

(*Continued from page xxvi*)



Transporting hogs to market in the Dutch East Indies.

Humane Work World Wide

Measures for the protection of animals against cruelty, though occidental in origin, are no longer as generally disregarded in certain Oriental countries as formerly. Humane societies are products of Western civilization, yet where native Orientals are reminded of their obligations toward the animals they possess and of the expedience of humane treatment, the prevention of cruel practices, we are told, is quickly approved. An example of this fact is the change brought about in the transport of hogs in Middle Celebes. Squealing pigs were cruelly harnessed and carried long distances to market, but through the intervention of humane groups, the bamboo carrier shown in the picture reproduced herewith was substituted since 1937. A leaflet received from Chas. Haasjes, entitled *Varkenstransport in de Toradja-landen*, by Assistant Veterinarian Moh. Mansjoer of the Institute of Buitenzorg, is the source of this information.

ARMOUR'S "*Fowler Brand*" Serum

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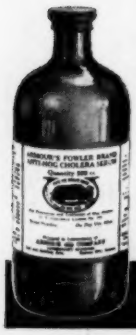

Remember these important facts about Armour's Fowler Brand Anti-Hog Cholera Serum:

A. It is prepared by skilled, experienced technicians, working under the supervision of graduate veterinarians...men who know your serum needs at first hand.

B. Its quality... its effectiveness and thorough dependability... are assured by the vast resources of Armour and Company. Resources of material, equipment, and technique, that cannot be surpassed.

Obviously, it's sound practice to make Armour's Fowler Brand Serum your constant ally for a winning fight against the most dreaded swine disease.

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ARMOUR and COMPANY, VETERINARY DIVISION, KANSAS CITY, KANSAS

BRUCELLA ABORTUS VACCINE

has taken its proper place in the control of Bang's disease through its use in calfhood vaccination.

Under recent requirements of the U. S. Bureau of Animal Industry, Brucella Abortus Vaccine filled into final containers after April 2, 1941, must be filled only in single dose vials, each vial to contain 6 c.c. The required vial is made of special alkali-free glass as an aid to the proper preservation of the vaccine.

We are supplying Brucella Abortus Vaccine packaged in the new improved vials and bearing labels meeting the new requirements.

PRICES:

Package 1-6 c.c. vial (one dose) $0.30
Package 10-6 c.c. vials (ten doses) 2.80

Less 10% trade and 2% cash discount.

We strongly recommend that every veterinarian who uses Brucella Abortus Vaccine read and re-read the recommendations made by Dr. John R. Mohler to the U. S. Live Stock Sanitary Association's December 1940 meeting, and that the principles suggested by Dr. Mohler be used as the guide in planning calfhood vaccination. If you do not have a copy of Dr. Mohler's recommendations, we shall be glad to send one upon request.

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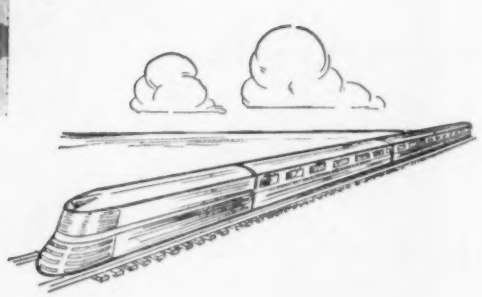

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